THE present molded insulation section of NEMA has undoubtedly been a stabilizing influence since its beginning, and most especially in the past eight months. A great deal has been said against it, however, and comparatively little for it, even though the favorable comment has been outspoken. We have mentioned it in our pages since last fall; at first with some trepidation, then with a backward glance at former "unions" and finally with full belief in its sincerity. This ultimate belief has come through actual contact with the members of the association, and its critics would do well to attend the next few meetings before voicing any opinion more openly. Please let it be understood that we encourage caution, but we believe that, like salt; "too much will spoil any banquet." And excessive and unnecessary caution is certainly narrowing the repast in certain sections of the country. The time to get in on something is when it starts to make a profit. Take the tip.

You have noticed that this is the day of job-lot publishing. Plastics is satisfied to work and grow not by high powered sales forces or wholesale subscription work but through the increasing good will it has earned since 1925.

Various chances have already come to the new publishers to go into combines and pools and to "make some real money by cutting down the overhead." But Plastics feels ready to tackle its work, alone and unattended. Not alone, however, for there can be sensed a growing good will. That's the sort of hook-up we want—from an Industry which needs a voice!

We have all just got under way, and we hope the way will be long and as continually pleasant as in the past. We all mean to keep on it, and we are a good deal more concerned in building for the future's underpinning than in cutting down to-day's overhead.

The Publishers

PLASTICS
& MOLDED PRODUCTS

A periodical devoted to the manufacture and use of plastic and composition products

Vol. 5 MAY, 1929 No. 5

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ERINOID

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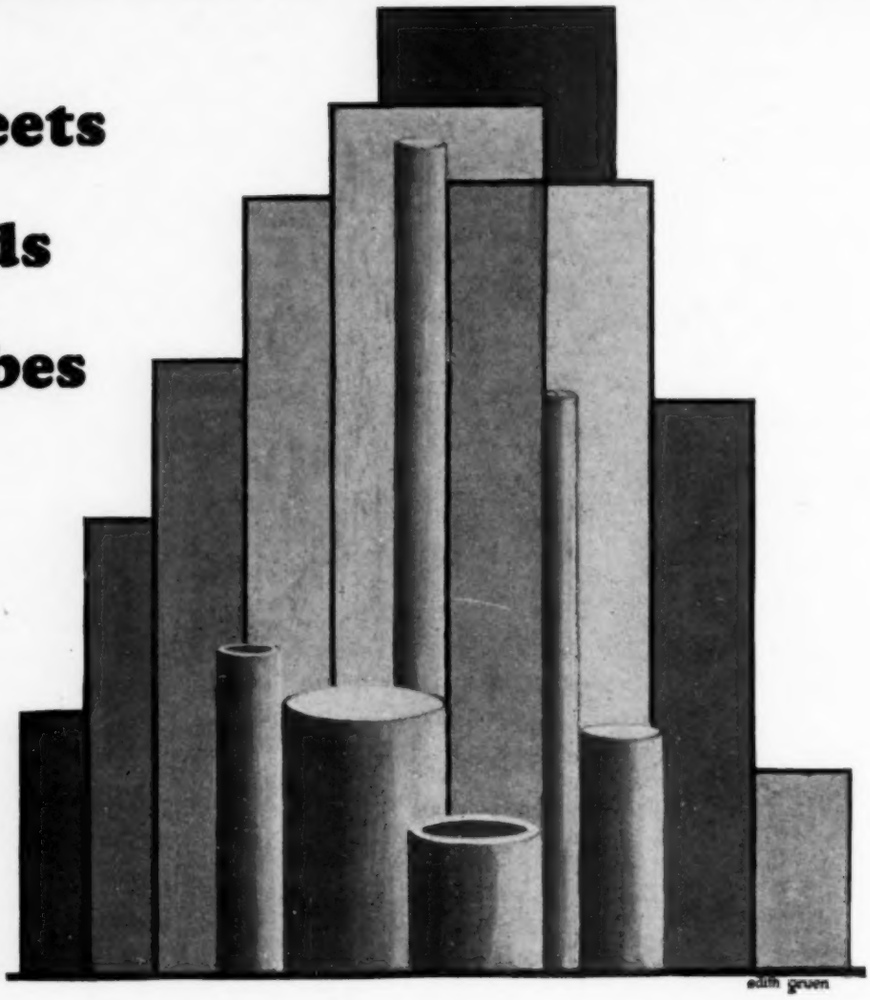
Tubes



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PLASTICS

A periodical devoted to the manufacture and use of plastic and composition products

Vol. 5 MAY, 1929 No. 5

Chemists Create Plastics but Don't Use Them

A plea for the recognition of the value of molded products in the field of chemical technology

By Carl Marx

Editor of Plastics

SINCE the early days of the alchemist, materials which have come to be designated as "plastics" have played an important role in the arts of the field of chemistry.

In its broadest sense a plastic material is one which is capable of being shaped by heat and pressure but which will retain, when the heat is lowered and the pressure removed, the shape of the imprint of the mold in which it was formed. In this respect, perhaps, the best known and widely used plastic material in use by chemists is glass.

Every chemist who has ever —and who has not? — blown glass or attempted to weld together two glass rods, is well aware of the remarkable plasticity of this substance.

Were it not for the inherent brittleness of glass at ordinary temperatures, this material would undoubtedly constitute the world's most extensive and useful plastic—and science may even overcome this drawback.

The Chemist Steps In

During the past century, chemistry has progressed from a state of empiricism to that of an exact science. The work done on ceramics, in itself one of the oldest of the arts of mankind, was on a rule and thumb basis until the chemist came to its rescue in the middle of the past century.

About the first plastic material truly so-called was, strange to say, based upon a naturally collodial substance, that is, cellulose. During the latter part of the 18th Century, the French especially developed to a high degree the art of shaping papier mache. This was cellulose or paper pulp mixed with sufficient glue and size to retain its shape after drying. Not, however, until the advent of Alexander Parkes, Daniel Spill and John Wesley Hyatt was the first real plastic—Celluloid—given to the world. This was in the year of 1869.

Constant Growth

Spurred on by the phenomenal success of celluloid the art of producing plastics grew at a remarkable rate, but the work was mostly of hit or miss nature as evidenced by the quantity of patents and processes described during the 20 years between 1870 and 1890. Then it was that chemistry as we now know it first began to produce the modern "plastics" and, armed with a knowledge of physical chemistry as so ably sponsored by Wo. Oswald, began to

Sticking slavishly to glass and corrodible metals, chemists and technologists are overlooking a real opportunity.

True, a few small beginnings have been made, but the field is unlimited and needs exploitation. Literally hundreds of possible uses for plastics about a laboratory or chemical plant should suggest themselves to the careful observer. Why not give plastics a chance? How about molded or laminated test-tube racks, burette stands, thermometer casing, stirring rods, beakers for products attacking glass, table tops, shelving, valve handles, stop-cocks, goggles, gears on motors, pulleys, balance cases, weight racks and cases, balance pans, supports for electrical apparatus, light sockets and switch plates, etc. etc.? Why should only fountain pen makers and household appliances dominate this field? Chemists are urged to send in their suggestions. We have urea-formaldehyde dishes now (Duraware). The field is wide open.

—Editor's Note

make genuine progress along scientific lines.

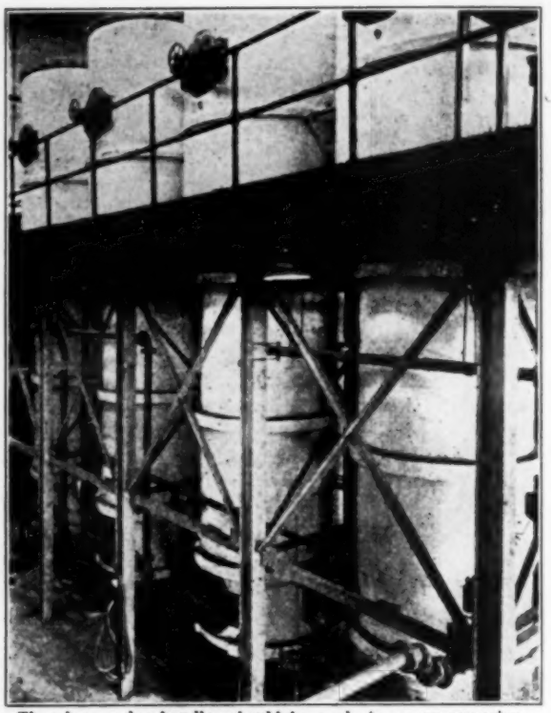
During the early part of the 19th Century, many chemists began to attack the problems of colloidal chemistry, and some rationale crept into the work of the inventors' and researchers' work in the field of plastics, and it was then realized that plasticity was not an inherent property of materials, but could be produced by chemical treatment, and especially by a line of rather undefined substances which have come to be known as "plasticizers". Chemistry was responsible for their discovery and application.

The Resinoids

Then came the work of Smith and Luft who brought to the world's attention the possibilities of plastic synthetic materials, namely, synthetic resins. This work was continued to a glorious conclusion by the unusual ability of Dr. Leo H. Baekland who may be truly said to be the father of the modern synthetic Resin Industry.

From the expensive laboratory methods first involved and through the maze of technical difficulties encountered and the almost overwhelming rules resistance to be overcome on the part of the public, Synthetic Resins have today reached a point of preeminence in the plastic field, and particularly where objects must be made to precise dimensions and in enormous quantities.

We would not for a moment, however, leave the impression that the cellulose plastics have not steadily progressed. All about us in our daily life we see evidences of the utility of and advancement in these products, as for instance in the cinema films daily unreeled before the projectors in the motion picture palaces. No one can question but that the modern triumph of the cinema art is in reality a triumph of the chemist and the happy blending of American Industrialism with Research and Art—(how much of the latter is a moot question).



The above valve handles should be made in a non-corrosive plastic.

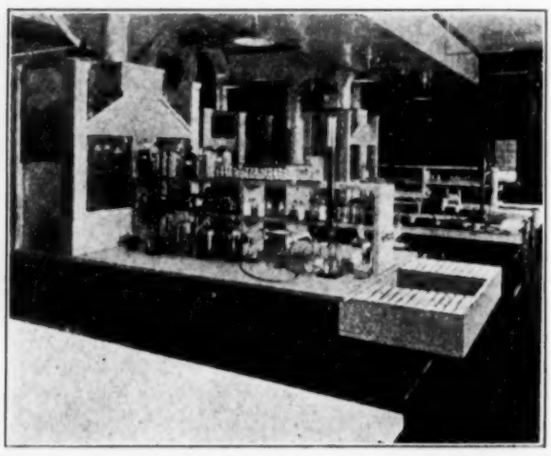
Thus far most of the applications of the plastic material, which are the products of the chemist's skill, are, strange to say, in a non-chemical field. Even the laboratories of the largest producers of plastic materials show but very few objects actually made for their output. Perhaps this might, in a measure, be explained on the well known principle that the shoe maker is apt to wear the worst shoes, so maybe the chemist is too close to the plastic material field to get its true perspective and truly realize how useful these materials may be in the chemical industry itself.

Occasionally one sees a few Bakelite beakers or perhaps a casein plastic horn , scale-pan or spatula, but when it comes to laboratory equipment, desk tops and instrument cases, these are made of wood, or metal, or glass.

With the present price of resonoid molding products, it seems incongruous, knowing the acid resisting properties of these materials, that they should fail of wide use in chemical laboratories and chemical uses generally. What would be more appropriate than molded resin materials for the making of a balance case? Why use painted burette stands? Why use iron that rusts when it is so much simpler to to use a rod or base made of a plastic material? However, a beginning has been made by balance manufacturers who furish molded weight cases. Valve handles, etc., which are made of wood that rots, or iron that rusts, or brass that is eaten by acid, are being replaced most advantageously by handles molded of resinoids.

Why this has not been done on a large scale is a mystery to the writer, as the cost of the material is sufficiently low as to warrant its use.

(*Continued on page 272*)



Interior of a laboratory showing the possibility of growth in the resinoids along these lines.

Pyroxylin as an Imitative Material

The manufacture of products similar to marble, onyx and other stones, mosaics and similar articles, consumes large amounts of pyroxylin plastics

By Joseph Rossman

This is a further portion of the complete compilation of the American patent art on this important phase of plastics. For earlier parts see this magazine for March and April, 1929.

Imitation Marble

In carrying out the process of patent 603,526 May 3, 1898 pyroxylin compounds are selected having solid colors corresponding with the tints of the marble desired to imitate. These compounds are cut or otherwise formed in fragments or pieces of suitable size, each color being kept separate, and these fragments or pieces are placed in a sieve or other similar receptacle and dipped in a dye. This dye may be the same for each solid color of the pyroxylin compound, or different colors may be used, and the arrangement is such that the pieces within the sieve may be wholly immersed and then withdrawn to allow the dye to drain off quickly. All the pieces of each solid color may be dipped in the same or in different dyes, or only partly dipped. In preparing the dye any solvent of pyroxylin is used, ethyl alcohol being preferred, and for coloring, dyes which are soluble in alcohol, such as nigrosen, Bismarck brown, dragon's blood, and many others are prepared. When thus prepared, the pieces of pyroxylin compound will each be found to have an extremely thin film of coloring matter over the entire surface, as may be seen by cutting away a small portion of one of the angles. When thus prepared, the pieces are ready for subsequent treatment, and they are immediately placed in the rolls and calendered until they are united in a homogeneous sheet. A number of these sheets are placed in the press and treated in the ordinary manner for cutting. When the latter operation is performed, it will be seen that the fine thin films of coloring matter present the appearance of fine markings separating the different colors and running in many directions irregularly, disappearing at some points and again reappearing, the varied markings and the solid colors being mingled with all the infinite variety of blending seen in the most highly-prized variegated marbles. By a proper selection of tints in the dyes used and by varying the size of the pieces of pyroxylin compound the operator can readily produce the most perfect imitation of all the variegated marbles known.

Fig. 1.

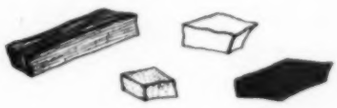


Fig. 2.

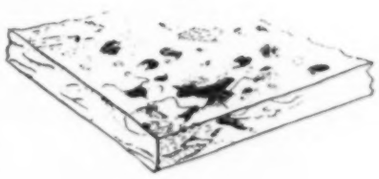


Fig. 3.

Fig. 1 is a view showing several pieces of pyroxylin compound of different body colors, part of the pieces being dyed upon the surface. Fig. 2 is a view showing a portion of a sheet formed from the pieces by calendering. Fig. 3 is a view of a portion of a sheet cut or planed from a block of pyroxylin produced from sheets similar to those in Fig. 2.

It should be noted that the action of the solvents used in preparing the dyes in which the pieces are dipped leaves the latter in the very best condition for rolling, and the sheeting produced is of the best quality, being perfectly homogeneous throughout and without the slightest weakness or tendency to separate upon the lines of marking.

It should be noted that in the imitation of marbles having an alabaster-like base with more or less translucence, like many of the Phrygian marbles, it will be desirable to use a suitable quantity of pieces of pyroxylin which are free from color and without any dye applied to the surface. In some cases also it may be necessary to vary the degree of translucency, which can readily be effected by means perfectly familiar to every one skilled in the art of manufacturing compounds of pyroxylin.

Imitation Onyx

Patent 546,360 describes a method for the manufacture of an imitation of onyx which ex-

hibits the stratified cloudlike markings of pale tints with the strong yellow or brown color breaking through in a direction opposed to the trend of the lighter strata. A mixture is prepared of soluble pyroxylin and suitable solvents (preferably camphor associated with either ethylic or methylic alcohol) of such well known proportions as form a soft combination suitable for mastication in rolls or equivalent apparatus. Before adding the coloring matter, this mixture is separated into two or more parts, each proportioned in quantity to the corresponding quantity of each of the different light tints desired in the completed artificial onyx. Each of these parts is then subjected separately to the action of the rolls, adding whatever color or pigment is necessary to produce the shade desired to the compound during the rolling process. There are thus produced crudely converted separate masses representing as many of the different light tints as are desired in the completed product. These crudely converted masses of different shades of color should be of a softer consistency than the final freshly formed onyx combinations, in order to cause a smooth flow of the materials in the rolls and prevent a ragged or abrupt appearance of the strata in the next step of the operation.

The next step in the process consists in rolling these separate and differently tinted masses, by means of the rolls, into rough sheets, say about one-half inch in thickness and twenty by thirty inches superficial area, more or less, according to the size of the batch or of the rolls employed.) These rough sheets of different tints a and a, Fig. 1 of the drawings, are next placed together face to face (one sheet of each tint) and passed through the rolls c in such a manner that they adhere as one mass to one of the rolls and, coming around, meet the last end of the combined superimposed sheets, as represented in Fig. 1, thus forming a continuous mass d, Fig. 2 which is permitted to revolve and thus mix, as at e, Fig. 2, at the intersection of the rolls (regulating the distance between the rolls by mechanical means) for such a length of time as will produce the amount of mixing desired. The mass is then partly cut and stripped from the roll, say once or twice, and permitted to become a revolving mass again to insure a more uniform mixing. When the combination of colors is such as to represent the lighter part of the onyx, (which can be determined by slicing off a test-piece occasionally,) the mass d is stripped from the roll and laid on a flat surface, and then appears like a rough thick sheet of combined light tints lying approximately in horizontal planes or strata, as shown in Fig. 3.

An analogous result, but somewhat inferior, can be accomplished by cutting the separately tinted masses into small pieces and repeatedly passing them collectively and parallel with each other through the rolls until they are flattened and planes of whose strata fairly

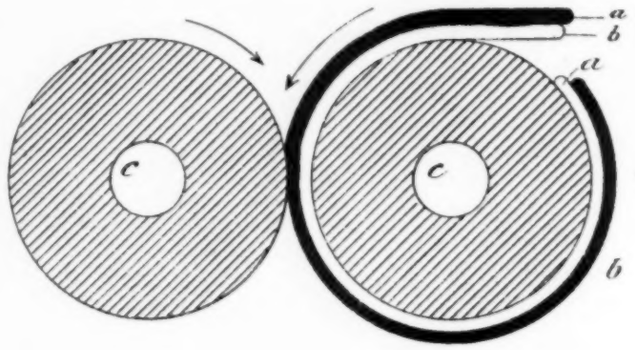


Fig. 1

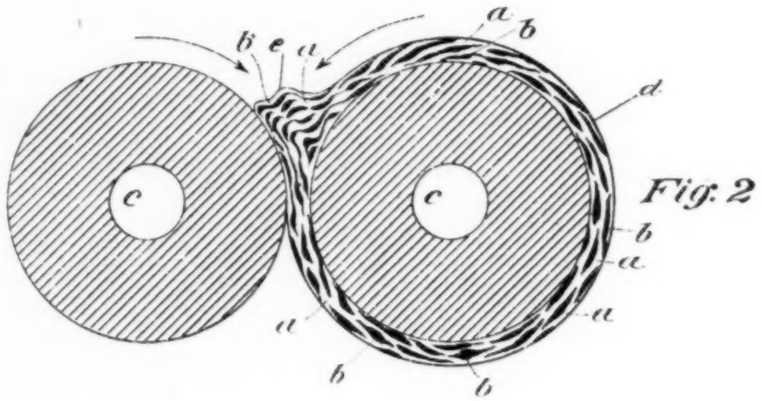


Fig. 2

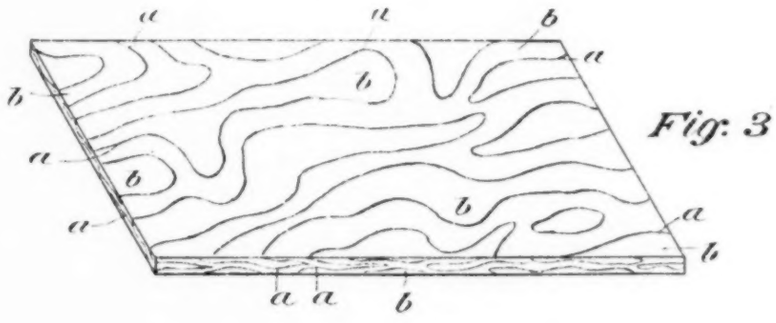


Fig. 3

How the mottled effects showing striations in onyx and similar stones are produced.

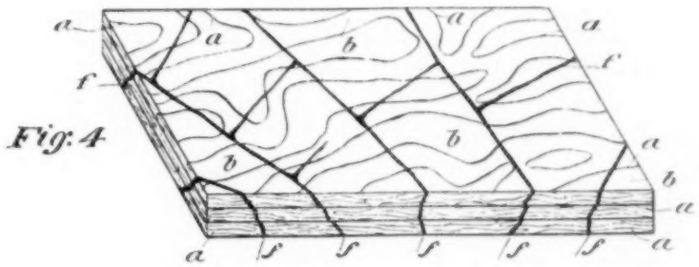
coincide with the surface of the sheet.

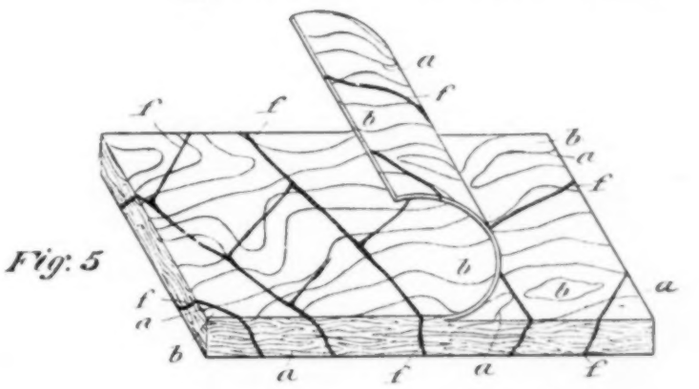
Strata Produced

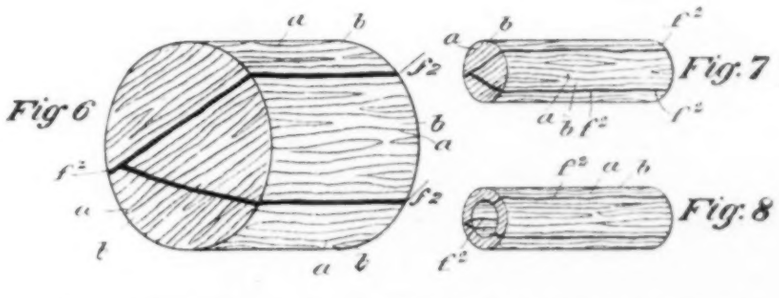
The next step is to produce an imitation of the raw yellow or brown streaks or veins of the natural onyx. This is effected by cutting the flat stratified sheet thus produced transversely and across the strata of light tints, regulating the shape, obliquity of the cut, or closeness of the cut places to each other, according to the particular sample of real onyx to be imitated. Into these cuts or divisions next is introduced a fluid having a dark yellow or brown color, and this may be made either of a coloring matter dissolved in alcohol or, preferably, a soluble color combined with dissolved pyroxylin, or even a sheet of soft yellow or brown pyroxylin composition can be used. The crude sheets thus made and containing horizontal strata of light tints with yellow or brown transverse perpendicular or oblique veins or lines of color f, Fig. 4, are next cut into suitable sizes and piles so as to form a number of superimposed flat sheets, as shown in Fig. 4. These are placed collectively in a chase and the chase put upon the bedplate of a press, and by means of a plunger the sheets are compressed, while heated, into a solid block or cake. From this block, when cooled, sheets are cut by means of a planing or veneering machine. Such a block, with a sheet partly cut therefrom, is shown in Fig. 5. "Pyroxylin as Imitative Material."

Method of Forming

The finished sheets exhibit the lighter tints of onyx in cloud like figures crossed with yellow or brown veins or bars of color with their planes in a direction transverse to those of the lighter tints, and the sheets so closely resemble genuine onyx that the most pleasing effects can be produced in articles cut or molded from them. Rods or tubes are formed by forcing the freshly rolled product (in the condition suitable for molding into a block) through a heated cylinder or the cylinder of one of the well known stuffing machines used in this art, gradually narrowed down, so as to contract the material into a small orifice, from which it emerges through a nozzle suitable for forming a rod or tube. It is placed in the cylinder in pieces, so arranged in a mass that the strata of yellow or brown will present their edges to the flat side of a lateral cross-section of a rod or tube so formed. A mass suitable for this purpose, with the strata f^2 properly arranged, is shown in Fig. 6. A finished rod is shown in Fig. 7 and a tube in Fig. 8.







Putting the cross-veins into imitation stone effects made from pyroxylin.

This interesting description of the many uses of the pyroxylin plastics will be continued in the June issue of PLASTICS.

If
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436
Do so
now!

Light and The Resinoid Plastics

How various inventors have attempted to overcome the light-sensitiveness and the darkening of synthetic plastics

By Charles W. Rivise
B. S. in Chem. Eng., LL. B., M. P. L.

In this article, Mr. Rivise discussess further patents relative to overcoming the main weaknesses of synthetic plastics. The preceeding articles may be had on request.

Patent 1,310,088 applies the supplemental heat treatment to phenol resinoids made by other processes.

Another method of making a phenolplastic without the use of contact media is described in Patent 1,210,982 dated January 2, 1917 by Fritz Pollak. The process is carried in the following manner:—

"94 parts of crystallized phenol and 25.7 parts of finely powdered anhydrous trioxymethlene are mixed with 3 parts of water and heated at 85° in the reflux condenser while agitating preferably in a current of inert gas. With vigorous boiling the temperature of the substance rises to approximately 113°. As soon as the internal heating ceases, the substance is still heated for a short time to 100° to 110° and then tapped off into the dehydration vessel. It is there heated to 160° to 170° when a scum forms and the substance becomes clear. It is then ready for use. Equimolecular quantities of the cresols or other homologous phenols can be employed instead of the phenol. The resins formed can of course be treated to form insoluble resins either before or after their dehydration by the addition of further quantities of formaldehyde or its polymers."

That most of the methods referred to above do not satisfactorily solve the problem is evident from the fact that many of the products are clear and

This is a continuation from page 211 of the April issue.

Mr. Rivise has scoured this field in order to present a complete picture of the situation. While considerable progress has been made in the past, much can yet be accomplished along these lines.

light colored only when freshly prepared. Even those that show fairly good resistance to light, darken considerably when heated, thus rendering entirely unfeasible the usual heat treatment in the varnish kettle to improve their solubility. Redman, Brock and Weith have found that even the brightest light will not affect a phenol resinoid provided that it is kept out of contact with an active gas such as oxygen. In Patent 1,345,695 dated July 6, 1920 they suggest a method of preserving synthetic resins based upon this discovery.

Patent Analyzed

The gist of their invention, as stated in their patent consists in:

"maintaining an infusible phenolic condensation product which is hard and strongly resistant to solvents or a manufactured article composed thereof, in an inert medium which will not substantially affect such product when exposed to the sunlight or other bright light."

The method may be carried out in a variety of ways. The most simple and most easily practised, perhaps, is to inclose the article in a vessel containing an inert gas. This gas may be at atmospheric pressure, or may be under reduced pressure. The vessel should be closed, so as to be practically airtight. If the medium employed be an inert gas at "atmospheric pressure" there is little difficulty in preventing diffusion of the gas with the atmosphere and vice versa, even though the vessel be not hermetically sealed.

As an illustration of the difficulty heretofore experienced with these transparent phenolic condensation products, we may state that such articles as cigarette-holders, cigar-holders, and pipes composed either partly or wholly of the transparent product are commonly placed on display in windows, in order to attract custom; and because of the discoloration which occurs when these articles are displayed in a window for some time, many of the articles must be sold, as seconds, at a reduced price. Thus, in the aggregate, very large losses occur. On the other hand, if the article be sold while it still possesses its beautiful color, it may be carried in the pocket, and under the ordinary conditions of usage will retain its attractive appearance for a long period of time. If exposed, while in the air, to bright light for any considerable length of time, the discoloration will occur, however. The bad effect, in such case, probably is due to the combined action of the light and the free or active oxygen in the air. That is, the free or active oxygen in the air will attack the condensation product if it be exposed at the same time to the sunlight, or to other bright light.

A good example of an inert gas which will serve effectively

as a medium for preserving the color of the condensation product is carbon dioxid (CO_2). If a vessel is filled with this inert gas and the condensation product articles are placed in the vessel, and the vessel be closed or sealed, the beautiful color of the articles will be maintained indefinitely, even though exposed to bright sunlight. The gas may simply displace the air in the vessel, and there will be practically no tendency to diffusion, if the vessel be closed tightly, even without hermetically sealing vessel. Another example of an inert gas which is suitable is nitrogen. Methane, or natural gas (CH_4) will answer the purpose, as will also ordinary illuminating gas. It is preferred, hower, to use a gas which is non-explosive and non-odorous.

Instead of filling the closed vessel with an inert gas of some such character as indicated by the illustrations given, the vessel may be rendered vacuous. That is, a vacuum may be employed. In such case the vacuum must be high enough to substantially eliminate the air, so that there will remain in the medium an insignificant amount of oxygen or other active gas. Vacuums of from ¼ to ¾ of a millimeter have been found satisfactory. A somewhat lower vacuum may be used, but in such case a very slight discoloration may occur.

Has Real Practical Value

A condensation product of the character referred to above is substantially anhydrous as well as infusible and practically insoluble, if made in accordance with preferred processes. Such a product is suitable to manufacture into various articles. By providing a method for preventing discoloration of manufactured articles until they are put into use, large losses may be prevented in connection with such articles as "cigar-holders, cigarette-holders and the like. In addition to this, however, the field for the use of this class of product will be enlarged because it will be practicable to employ the condensation product still more largely in the arts, including the replacement of amber, coral or the like.

"It is practicable to employ the method herein described in connection with window display cases or receptacles. Such cases or receptacles may have the walls composed wholly or largely of glass; and, if tightly sealed and containing an inert medium, the articles may remain therein for an indefinite period, exposed to bright sunlight, without discoloration. The manufactured articles may also be kept in sealed glass retainers, containing an inert medium, on the counters or shelves of stores, the articles being taken from one container, after another, as required."

Help From Austria

It is intimated in this patent that an article preserved in an inert medium will not become discolored after being removed from the container. This is of course not so and the method, therefore, cannot be considered as a solution of this vexing problem.

Fritz Pollak claims to have improved the product by modifying his phenol-trioxymethylene process. The following example is taken from his Patent 1,210,982 mentioned above:—

"Example II: A mixture of 370 parts of pure crystallized carbolic acid and 6 parts of meta-cresol is heated in a water or oil bath under good stirring. A neutral gas such as for instance nitrogen may be introduced into this mixture, to which is then added 20 parts of finely powdered anhydrous trioxy-methylene. The temperature of the bath is then allowed to rise up to 5 degr. C., when an energetic reaction will set in the temperature of the mixture rising above 100 degr. C. When the temperature has dropped again below 100 degr. C., I add another 20 parts of anhydrous trioxy-methylene and this operation is repeated until in all 80 parts of anhydrous trioxy-methylene have been added. During the exothermic reaction a small quantity of water distils over, carrying with it some phenol and traces of formaldehyde. This mass is now filtered, allowed to cool down and then repeatedly washed with large quantities of water of less than 40 degr. C. The remaining product is gradually heated above 105° C., preferably up to about 130 degr. C. whereby the water and most of the free phenol are distilled over. It is not advisible to heat the mass above 130 degr. C., as then "the mass will assume a brownish color. The product obtained after cooling is a slightly yellowish resin, soluble in alcohol ether, acetone and caustic soda and smelling but very faintly after phenol."

The manner of carrying out this process as well as the quantity of anhydrous trioxy methylene employed may be varied within wide limits. With more anhydrous trioxy methylene a thicker product will be obtained. If an excessive quantity of anhydrous trioxy methylene had been admixed, the product obtained can not be washed out properly with cold water and will have to be heated in order to entirely remove the phenol; this treatment however will result in the production of a reddish or brownish product. If on the contrary the quantity of anhydrous trioxy methylene used is too small, the loss of phenol will be far greater. It is therefore advisable to use about the quantities indicated in the example given above, which correspond to 3 molecules of phenol and 2 molecules of anhydrous trioxy methylene.

Pollak's Further Aid

Pollak has contributed several variations of the above methods, some of which appear to result in satisfactory products. Thus in Patent 1,211,227 dated January 2, 1917 carbolic acid is caused to react with a mixture of beta and gamma polyoxymethylene (sometimes erroneously known as trioxymethy-

(Continued on page 266)

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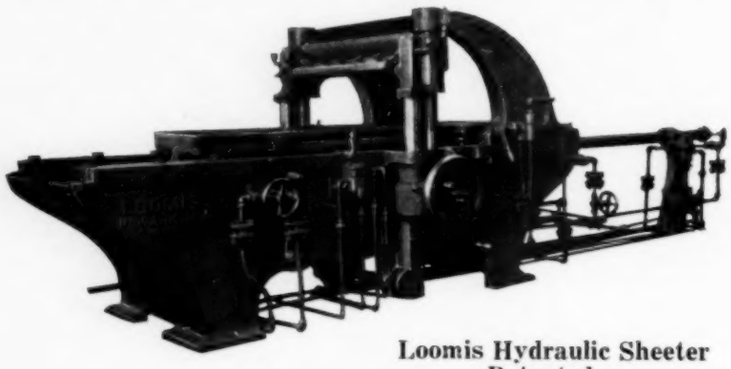

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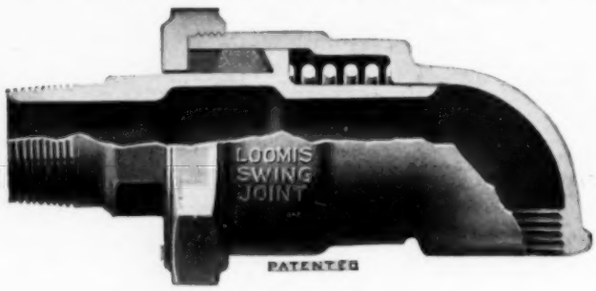

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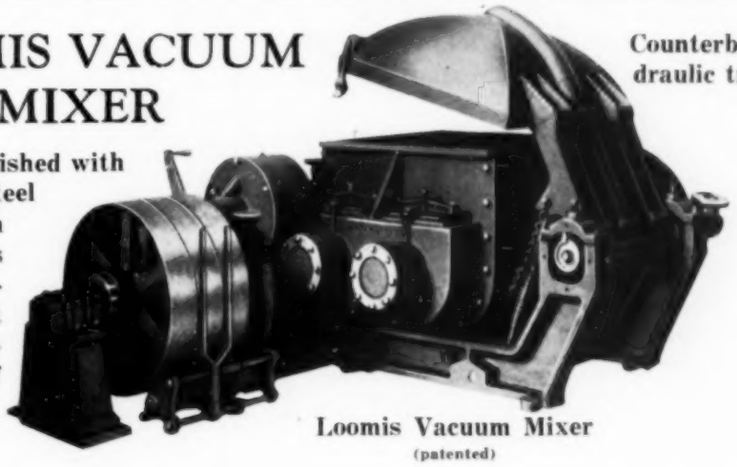

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The World's Recent Progress in Synthetic Resins

A complete and condensed account of patents from the most important industrial countries

By Dr. Aladin

THE concise resume in the following tabulation is of special value to all who are trying to keep up with the work done in all the world in their chosen field. Only one who has spent many weary hours in searching through the records of the Patent offices of the different countries can fully appreciate how much effort is required to get together data of this sort. By offering these compilations to the public we feel that we have given it a small library in itself, on this subject. This is the first time an article of this type has been available in the English language. Former similar articles by the same able writer have appeared in our valued German contemporary Kunststoffe. The present series is, however, entirely new and continues where the last review by Dr. Aladin in that journal left off. Althogether there are 494 patents in the present list. A complete index will form part of our service in this connection. This article continues from our April issue, where a complete classification of the resins into 22 groups was given.

I. RESINS FROM PHENOLS AND ALDEHYDES

1. General, and Apparatus

Serial No.	Patent Number and Date	Inventor or Assignee	Title of Invention	Subject Matter of Invention
1	U. S. 1,660,403 2-20-1924	V. H. Turkington (Bakelite Corp.)	Continuous process for making phenol resins.	Continuous preparation of phenolic resins in which the materials are passed through pipes heated by an oil bath, the time being regulated to effect proper condensation. The dehydration takes place in vacuo, the entire device being one apparatus.
2	U. S. 1,669.831 10-16-1925	C. Kulas	Preparation of Artificial resins.	Describes an apparatus for the manufacture of artificial resins. The raw materials are contained in storage tanks and are pumped into the reaction vessel. After formation of the resin and separation of the water by centrifugal means the resin is applied to the periphery of a heated drum and scraped therefrom by a doctor-blade.
3	Ger. 459,310 3-19-1926	Allgemeine Elektricitäts Gesellschaft	Device for Controlling the re-action in the manufacture of artificial resins	Viscosity developed by the reacting mixture serves to actuate an indicating device so that the reaction may be interrupted at a predetermined point.

2. Preparation of Phenol-formaldehyde resins using Acid Condensing Agents.

4	U. S. 1,566,817 8-23-1922	S. Karpen Bros.	Resinous Condensation products from phenols and formaldehyde	Methylals, for example methylandiethyl ethers are condensed in the presence of water and small amounts of hydrochloric acid, the phenol being in excess. The reaction takes place under pressure at 180° C. After removing the alcohol formed, the resin is dehydrated and may be hardened.
5	U. S. 1,582,056	C. Kulas and C. Paulding	Resinous Condensation product from phenols and formaldehyde	Phenol and formaldehyde are condensed in presence of hydrochloric or of oxalic acid until resin formation has taken place. Then an access of a basic condensing agent (such as soda, sodium hydroxide, sodium sulfite and the like) is added together with a new quantity of phenol and formaldehyde and the heating is continued. The water formed is then removed and the hot resin mixed with amyl alcohol and glycerol. To obtain greater elasticity some camphor oil may be added. The resin is then hardened.

Serial No.	Patent Number and Date	Inventor or Assignee	Title of Invention	Subject Matter of Invention
6	U. S. 1,637,512 5-24-1927	L. H. Baekeland (Bakelite Corp)	Preparation of resinous condensation products from dioxydiphenylethane and bodies containing and active methylene group.	Dioxydiphenylethane, which is obtained from phenol and acetaldehyde with the use of hydrochloric acid as a catalyst is heated with formaldehyde or its polymers to 180-200° C.
7	U. S. 1,645,226 8-26-1925	C. B. Carter (Karpen Bros.)	Phenol-aldehyde resins from methylals	A mixture of 1.5 mols. of phenol or cresol and 1 mol of a methylal (such as dimethyl, or diethyl-) is, in the presence of water and with 20% of an acid condensed to form a fusible resin. After removing the acid by washing with alkaline fluids the product can be further hardened by using formaldehyde or hexamethylenetetramine.
8	U. S. 1,648,858	M. Melamid	Preparation of resinous condensation products	Phenolalcohols such as may be prepared from phenol and formaldehyde are treated with aromatic sulfochlorides such as phosgene or with organic acid anhydrides, forming light colored resins which are soluble. By using phenolic sulfochlorides or salicylsulfochlorides opaque resins are obtained. These can be hardened by heat.
9	U. S. 1,650,899	H. W. Matheson and F. W. Skirrow (Canadian Electro Products Co.)	Preparation of resinous condensation products from phenols, acetylene and aldehydes	The resinous products formed when acetylene and phenols are allowed to react in acid solutions in the presence of mercury sulfate are treated with aldehydes such as formaldehyde, paraformaldehyde, furfural, paraldehyde etc. Pressure and condensing agents may also be used and the products may be hardened with hexamethylenetetramine, aldehyde-ammonia, ethylidine or furfuramide.
10	U. S. 1,653,302 8-19-1923	H. W. Matheson (Canadian Electro-Products Co.)	Manufacture of condensation products	300 parts of a phenol are condensed with 126 parts of acetaldehyde with addition of less than 1% of an inorganic acid or organic halogen compound at not over 80° C. The resin, after neutralization and washing can be used with hardening agents such as hexamethylene tetramine, phenylenediamine, aldehyde-ammonia etc. Either lacquers or molding powders may be produced.
11	U. S. 1,667,872 9-27-1922	C. F. Schrimpe (Bakelite Corp.)	Manufacture of butylaldehyde-phenol resins	100 parts of a phenol are condensed with 65 parts of butylaldehyde, using 1-3 parts of hydrochloric acid. After the reaction is complete the mixture is heated 4 hours longer. The resin formed is separated and dehydrated at 180° C. By the addition of 5-10% of formaldehyde and hexamethylene tetramine.
12	U. S. 1,677,417 7-7-1927	V. H. Turkington (Bakelite Corp)	Preparation of resinous substances	Phenols in admixture with tung oil are condensed by means of acid condensing agents (phosphoric acid, boric acid or rosin) and heat. After addi- of formaldehyde and a non-phenolic resin (natural resins, resin esters, cumarone resin, glytal resin etc.) the condensation is completed.
13	U. S. 1,679,322 4-4-1922	J. McIntosh (Diamond State Fibre Co.)	Preparation of artificial resins	Aldehyde-like etherial oils such as oil of cinnamon or oil of cassia are condensed in presence of hydrochloric or sulfuric acid. After removing the catalyst the further operations follow the usual course.
14	Can. 258,609	S. Karpen and Bros.	Condensation products from phenols and formaldehyde	Same as U. S. 1,566,817. (No. 4).

Serial No.	Patent Number and Date	Inventor or Assignee	Title of Invention	Subject Matter of Invention
15	Can. 263,373	C. L. Byck (Bakelite Ges. m.b.H.)	Preparation of resinous elastic coatings from phenols and formaldehyde	See Swiss 122,993. (No. 38) and Swiss 123,274. (No. 39).
16	Danish 35,423	C. Kulas and J. Scheiber	Resinous condensation products from phenols and aldehydes	See German 436,779. (No. 18).
17	Ger. 436,445 1-15-1921 (Frdl. XV 1214)	Riebecksche Montanwerke A.-G.	Preparation of esters of non-resinous condensation products of phenols and formaldehyde. Addition to Ger. 352,003	The incipient condensation product produced from formaldehyde and phenol in presence of small amounts of acids is treated in alkaline solutions with allyl- or vinyl halogenides.
18	Ger. 436,779 3-18-1924 Frdl. XV 1199	C. Kulas and J. Scheiber	Preparation of resinous condensation products from phenols and aldehydes	A fluid condensation product of phenol and formaldehyde made by boiling with a little oxalic acid is separated from water and placed on differential rolls heated to 150-160° C. the speed of rotation being so controlled that a light resin melting at 80-90° is scraped off the rolls by a doctor blade.
19	Ger. 456,931 7-19-1923	Interessen Gemeinschaft Farbenindustrie (A. Voss)	Preparation of water-soluble condensation products. Addition to Ger. 408,871	A condensation product made in acid solutions from phenol and formaldehyde is heated to 110° C. and while being slowly stirred has added to it some zinc chloride and benzyl chloride-p-sulphonic acid. Hydrochloric acid is evolved. The product is poured into water, the insoluble matter recovered, and after boiling down the product forms a substance suitable for tanning.
20	Brit. 230,861 3-16-1925	C. Kulas and J. Scheiber	Preparation of resinous condensation products of phenols and aldehydes	See Ger. 436,779. (No. 18).
21	Brit. 231,501	A. Danilowitsch and G. Petroff	Preparation of clear and transparent infusible condensation products from phenol and formaldehyde	The condensation is effected with p naphthaline-a-sulphonic acid as catalyst in the presence of fusel oil and glycerol.
22	Brit. 254,703 10-23-1925	S. Karpen and Bros.	Resinous condensation products from phenols and formaldehyde	See U. S. 1,566,817. (No. 4).
23	Brit. 261,447 7-14-1925	S. M. Kropman and P. Horowitz	Preparation of dentures	Equal parts of phenol and formaldehyde.
24	Brit. 267,736	Bakelite Corp.	Elastic products such as coatings from phenols and aldehydes.	See Swiss 122,993. (No. 38). and Swiss 123,274. (No. 39).
25	Brit. 295,442	Bakelite Corp.	Resins from dioxydiphenyl ethane etc.	See U. S. 1,637,512 (No. 6).
26	French 594,932 3-10-1925	C. Kulas and J. Scheiber	Resinous condensation products from phenols and aldehydes	See Ger. 436,779. (No. 18).
27	French 596,392	A. Danilowitsch and G. Petroff	Preparation of clear transparent infusible phenol-aldehyde resins	Condense by use of naphthalene a-sulphonic acids in presence of fusel oil and glycerol. Cf. Brit. 231,501. (No. 21).
28	French 605,736 11-5-1925	S. Karpen and Bros.	Resinous condensation products from phenols and formaldehyde	See U. S. 1,566,817. (No. 4).
29	French 615,713	L. C. Byck (Bakelite Corp.)	Resinous elastic coatings from phenols and aldehydes	Phenols are first condensed with fatty oil (tungoil) in presence of acid catalysts such as aluminum chloride, phosphoric acid etc., then condensed with a deficiency of formaldehyde and the soluble and fusible products obtained treated with further amounts of formaldehyde, paraformaldehyde or hexamethylene-tetramine.
30	French 634,925 5-24-1927	Bakelite Corp.	Resinous products from dioxydiphenylethane and bodies containing active methylene groups.	Cf. U. S. 1,637,512. (No. 6).

This important compilation will be continued each month until completed.

Artificial Plastics in the Pulp and Paper Industry*

By Chas. W. Rivise
B. S. in Chem. Eng. L. L. B., M. P. L.

It is astonishing what little knowledge the average "paper" man has of plastic material. This article shows the importance of such materials in everyday paper production, and summarizes some important patents along these lines.

Artificial plastics, for the purposes of this article, may be divided into the following two classes:

1. The non-resinous plastics, including among others, the celluloids, the cellulose esters and ethers.

2. The resinous plastics, which may be further divided into:

A. The modified resins which are obtained from natural resins by means of special chemical processes designed to modify their composition and their properties.

B. The synthetic resins—materials which though not strictly resins, approximate the natural resins in some of their physical properties and which may be obtained by chemical processes from non-resinous starting materials. The term "synthetic resin" is also very frequently applied to all artificial plastics, however obtained.

The Cellulose Plastics as Paper Sizes

"The cellulose plastics are of interest to workers in the paper industry principally because they are usually made of the same starting materials as is paper. In fact celluloid or Xylonite is often made from paper itself. It is interesting to note that these plastics have been suggested for use as paper sizes as well as artificial leather coatings for paper and other fabrics. For example in Patents 1,505,043 dated August 12, 1924; 1,563,204 dated November 24, 1925 and 1,625,416 dated April 19, 1927, Lilienfeld suggests the use of ethyl derivatives of cellulose for these purposes. However, most of the artificial leather that is being made at present consists of some coated fabric other than paper.

The Modified Resins as Paper Sizes

The modified resins have also been suggested as paper sizes. Thus Carleton Ellis in Patent 1,007,681 dated November 7, 1911 describes several methods of making a paper size from the rubber resins obtained in the purification of Jellutong or Pontianac gum. These products are practically unsaponifiable and are therefore waste products. But when mixed together with a saponifiable resin, such as rosin and an alkali, there is formed a size which is said to be particularly resistant to light. Guayule resin as well as a colloid carrier such as carbohydrates and albuminoids may also be added. When the guayule resin is added the size is only suitable for dark or colored paper.

The Synthetic Resins as Paper Sizes

Similarly the synthetic resins, particularly cumaron resin and the phenolic condensation products, have been suggested and tried with more or less success. Since cumaron resin cannot be directly saponified by means of an alkali, it must first be mixed with a saponifiable resin such as rosin. Thus Muth in Patent 1,194,866 dated August 15,1916, melts rosin and cumaron resin together and then boils the mixture with just sufficient alkali or ammonia or alkali metal silicate until the whole mass forms a uniform emulsion. A variation consists in melting the cumaron resin together with a saponifiable oil or fat before the alkali is added. The advantage of using an artificial resin is that it can be prepared with a greater degree of purity than can a natural resin

In German Patent 348,063 dated September 6, 1918, the cumaron resins are mixed with an alkali salt of a sulphonated aromatic or naphthenic acid to facilitate emulsification. A variation consists in first mixing the resin with an aromatic or naphthenic compound and then sulphonating the mixture. In either case the neutralized and emulsified product can be used as a paper size.

The use of the cumaron resins as sizes brings to mind Patent 1,302,209 to Perry dated April 29, 1919, and Patent 1,218,599 to Eichler dated March 6, 1917. In the first patent is disclosed a substitute for a roofing felt made by incorporating rosin, cumaron resin, bakelite or other resinous material into the watery pulp of beaten rags or paper or a mixture of the two. The resin is added in a comminuted form or as filaments of dry material to

*Presented at Annual Meeting of TAPPI, New York, Feb. 20, 1929.

the stock in the beater and the mixture is formed into sheets in the usual manner.

In the latter patent the cumaron resin is added to a heated quantity of a vegetable oil, such as China wood oil, linseed oil, poppy seed oil or soy bean oil, and the mixture added to a volatile solvent. The inventor claims that a sheet of paper impregnated with the resulting mixture is rendered not only transparent and waterproof, but also acid and alkali resistant and its tensile strength is almost doubled. A leather substitute may be made by impregnating and coating a fabric with the mixture.

The Various Synthetic Resins

Besides the cumaron resins and the phenolic condensation products, the class of synthetic resins includes the phenol sulphur resins, the glyptals which are made from glycerine and phthalic anhydride, the urea and thiourea derivatives and the ketone resins as well as a great number of others that can be made from diverse materials as corncobs, nitrogenous residues, tars, proteins, albumins, casein, aldehydes, phenols and their derivatives. It has even been proposed to utilize the waste sulphite and residual black liquors from paper manufacture as starting materials.

Synthetic Resins from Sulphite Black Liquor

In patent 1,143,714 dated June 22, 1915, Knight concentrates and ferments the waste liquor, in the manufacture of wood pulp to produce alcohol. The alcohol may be distilled off by means of sodium or potassium dichromate; a small amount of condensing agent is added and then enough phenol, cresol or creosote oil is added to combine with both the lignone compounds of the waste liquor and the acetaldehyde. The dichromate acts as the oxidizer for the alcohol and the chromium salt produced acts as the condensing agent. Other condensing agents mentioned are acids such as hydrochloric, alkalis, such as caustic soda or potash; salts such as sodium thiosulhydrochloric acid, ferric chloride, ferrous or ferric sulphate or lime. Ammonium carbonate may also be used. Various diluents or modifying agents such as nitro, chloro or amido compounds of aniline, naphthalene, benzol, toluol or anthracene may be added before or during the condensing step. The condensation may be carried out in situ in wood or other porous material to produce insulators. The product is said to be suitable as a rubber or shellac substitute as well as a varnish or electrical insulating composition.

Black Liquor Acidulated

In Patent 1,614,025 dated January 11, 1927 Conner acidulates the residual black liquor derived from coniferous woods in the soda process with sulphuric acid, grinds and dries the precipitate. He then dissolves the resulting wood gum containing lignin and resin acids in caustic soda and adds a phenolic material such as cresylic acid and formaldehyde, acetaldehyde or hexamethylenetetramine successively. He heats the mixture until the reaction occurs when it is cooled and neutralized with niter cake or sodium acid sulphate, washed, dried, ground with a filler such as wood flour and molded into the desired shape.

In Patent 1,561,728 dated November 17, 1928, Kirschbraun suggests mixing the waste sulphite liquor with a bituminous emulsion and paper stock before adding a converting agent such as formaldehyde thereto. The mixing is preferably done in the beaters, but it is permissible to coat previously prepared paper with an emulsion containing the sulphite liquor and bitumen and unite several plies thereof. The product is said to be a waterproof and greaseproof paper.

Methods such as those disclosed by Knight, Conner and Kirschbraun should go a long way toward solving the problem of what to do with waste products of the pulp and paper industry, as well as decreasing the costs of production in both the paper and plastic industries. As yet, not much has been done to commercialize these methods, but the future holds much in store for inexpensive methods of preparing synthetic resins and the day may yet come when the waste products of the paper industry will be the raw materials of the plastic industry.

The Interdependence of the Plastic and Paper Making Arts

Be that as it may, it is an inescapable conclusion that the plastic and the paper industries have mutually contributed to each other's growth and will in the future continue to become more and more interdependent. Paper materials are particularly suitable as fillers for synthetic resins. Many patents mention this use and an increasing amount of paper is being used for this purpose.

At this point it should be clearly understood that the addition of fillers to synthetic resins, particularly of the phenol-plastic type, is not necessarily for the purpose of cheapening these materials. Very rarely, indeed, are resins hotpressed by themselves for commercial purposes; they are too brittle and lack the requisite resiliency for many purposes. It is the so-called fillers that remedy these drawbacks and when carefully selected and employed, they materially assist the plastic in developing increased elasticity, resistance to blows and shocks and in making them easier to work upon mechanically. The misnomer "filler" is being gradually displaced by more accurate terms as "reenforcement", "extending agent", "modifying agent" and "binder".

Methods of Incorporating Resins and Fillers

There are various methods of incorporating the fillers into the plastic, or incorporating the plastic into the filler. In Patent 939,966 to Baekeland dated

(*Continued on page 269*)

Prophetic and Professional Inventors

By Harry Price

An enlightening article for every inventor. Reprinted from the January "Chemical Bulletin," Chicago.

Many laymen regard the ability to invent as a gift given by the Creator. They class inventors in somewhat the same class as prophets—as persons to whom some great revelation has been made. Invention is sometimes considered a hit or miss affair, as something which comes without warning—without preparation—but suddenly as a happy thought. But the truth is that a vast majority of the valuable inventions have been made by those who worked long hours deliberately to solve a problem and to eliminate a difficulty—who have tried many solutions and have failed many times—and who knowing the accomplishments and labors of their predecessors, have made a step forward and achieved a successful solution.

It is unfortunate that most inventions which are floating about, and many patented ones, are the spasmodic conceptions of prophetic inventors. These inventors frequently conceive of a supposed solution to a problem which has not become clearly defined in their mind. They do not know what others have done before them and they seldom conceive the possibility that their solution might have been thought of long before Hector started to grow a full sized canine. Inventions of this character occupy a large part, if not a major portion, of the time of the United States Patent Office and of patent attorneys taken collectively—the former in discouraging the application for a patent and the latter in the determination whether or not this supposedly happy solution has not been previously known, described or used. This last mentioned determination should have been made before the invention and not after, as usually is necessarily the case with spasmodic inventions.

One of the strangest things about this class of inventions is that they usually relate to a field in which the inventor by profession and experience is a stranger. As actual examples, there might be cited the cases of salesmen and clerks discovering perpetual motion machines, an architect inventing an automobile bumper, a policeman conceiving of a street car control, and a farmer inventing a helicopter. It is rather difficult to classify a rather successful invention by a noted chemist, Carleton Ellis, consisting in forming a dog biscuit in the shape of a bone (U. S. Patent No. 982,711) except possibly as an exception. There is a great urge among the general public to make inventions for the reason that people visualize such inventions as the stepping stones to fortune and consequently there will always be many haphazard inventors. And tragedy often resides in the conversion of the high expectations of these inventors into very poor realizations.

The more important inventions, however, are usually those of the professional inventor who is generally employed in the research and development department of a large corporation, or in a consulting laboratory. Most of these professional inventors are in a way multi-professional. They are not only members of the inventing profession, but also members of the profession or field to which their invention relates. The non-professional or amateur inventor who sets about solving a problem or eliminating a difficulty, chemical or otherwise, should take the same course as the professional inventor. That is, he should first determine exactly what is the impediment to be overcome, and should make investigation as to whether or not anyone before realized the difficulty and as to what steps or efforts were made to conquer it. This may be done by investigating the prior patents, the abstract journals and other publications. Fortified with this information he should lay out a plan of attack and formulate a series of approaches to a solution. Finally he should start the attack. If his first attempts meet failure, he should try and try again until he convinces himself that the problem is impossible of solution—or what is probably more true, that he is unable to solve it. The processes of the professional invention do not usually commence and end within a few days or weeks—but in many cases take years of constant endeavor. And in the long run it is this class of inventions which create the greatest benefits to both the public and the inventor himself.

The main thought of this article was sponsored by one of the readers of this column who has had great difficulty in dealing with spasmodic inventors. As a rule such inventors aim to realize on their invention quickly and before they secure a patent. They offer their rights to one who might be interested and place upon him the burden of judging whether or not patent protection can be secured. Such inventors in order to realize upon their inventions should be in a position to demonstrate without doubt wherein their invention lies. Or they should wait until they have obtained this information through the grant of a patent.

Technical Abstracts Section

A Concise Review of Patents and Literature

Cellulose Esters containing Unsaturated Organic Acid Groups. U. S. P. 1,690,620; Nov. 6, 1928. Hans T. Clarke and Carl J. Malm, assignors to Eastman Kodak Co.

Three parts by weight of cotton tissue paper, such as is used in the manufacture of cellulose acetate, is added to a mixture of 15 parts by weight of cinnamic acid, 40 parts by weight of chloro-acetic anhydrid and .05 parts by weight of magnesium perchlorate. The thoroughly mixed reaction mass is then warmed at 60 to 65° C. until the fibers disappear and a more or less clear dope is obtained. This may take say about 5 hours. From the reaction mass the cellulose cinnamate is obtained by precipitation in methyl alcohol, and washing with the same. The product is soluble in chloroform and from its solution yields transparent films or varnish layers.

In another example, 5 parts by weight of the above mentioned tissue paper is added to a mixture of 15 parts by weight of crotonic acid, 30 parts by weight of chloroacetic anhydrid and .05 parts by weight of magnesium perchlorate. The thoroughly mixed reaction mass is kept at 60 to 65° C. until the fibers largely disappear, and more or less clear dope is obtained. This generally occurs in about 5 hours. The cellulose crotonate is obtained from the reaction mass by precipitation with a 50% aqueous methyl alcohol solution, and washed with the same liquid. The product, when dried, is soluble in acetone, chloroform, benzol, or mixture of these. Its soltuions yield transparent films.

Mixed Cellulose Esters containing nitro groups and halogen-substituted acyl groups. U. S. P. 1,690,621; Nov. 6, 1928.

Ten parts by weight of dry nitrocellulose containing about 11% of nitrogen are dissolved in a mixture of 50 parts by weight of chloroacetic anhydrid, 25 parts by weight of crotonic acid, and .05 parts by weight of magnesium perchlorate. The mixture is kept at 60° to 65° C. or about six hours. The cellulose nitrocrotonate thus formed is precipitated by pouring the reaction mass into methyl alcohol. This precipitate is dissolved in acetone and then reprecipitated by pouring the solution into a 50% aqueous solution of methyl alcohol. This second precipitate is preferably washed first with methyl alcohol and then with ether, finally being dried. It is soluble in acetone and in acetic acid but insoluble in chloroform, ether, or a mixture of ethyl alcohol and ethyl ether.

This intedmediate product is next submitted to a halogenating agent. For example the entire cellulose nitrocronate, obtained above, is dissolved in 100 parts by weight of acetic acid and 10 parts by weight of bromine are thoroughly incorporated into the solution. The mixture is allowed to stand until the desired halogenation takes place. We have found that two hours at room temperature brings about a useful bromination. Instead of bromine, chlorine gas can be bubbled through the reaction mixture until the latter is saturated and then the mixture allowed to stand. The brominated product can be precipitated from the acetic acid solution with water, washed well with the latter, and then dried. It is soluble in acetone, acetic acid, and ethyl ether, but is insoluble in chloroform, or ethyl alcohol. Under the conditions given in the above example, it contains about 17.8% of bromine and 6.8% of nitrogen. When its acetone solutions are coated and allowed to set into films, the latter are transparent and fairly flexible. By varying the amounts of ingredients and the time of the first reaction, the amount of unsaturated acyl groups in the intermediate ester can be regulated, and thus upon halogenation, there will be obtained nitro esters having different percentages of halogenated acyl groups.

Cement for Cellulose Ester Plastic Strips. U. S. P. 1,690,622; Nov. 6, 1928. Otto W. Cook, assignor to Eastman Kodak Co.

To render the cement visible when used in the dark room, a suitable organic dye is added thereto. Examples: xylene blue, methylene green etc.

Chloroform-soluble cellulose acetate. U. S. P. 1,690,632; Nov. 6, 1928. Harry L. B. Gray and Cyril J. Staud, assignors to Eastman Kodak Co.

100 parts by weight of filter cotton are agitated for about five minutes in a bath of 1400 parts by weight of acetic anhydrid, (94% strength) and 0.9 parts of sulphuric acid (98% strength) and 0.9 parts of phosphoric acid (85% strength). This is then pressed until the cellulose and adherent liquid amount to 320 parts, corresponding to about 100 parts of cellulose, 220 parts of such anhydrid, and the retained catalyst, approximately .257. At this time the mixture has the appearance of the original cellulose slightly moist with acetic anhydrid. Upon shaking the mixture, the fibers move practically as freely as untreated cotton would do. It is left in a closed vessel at room temperature until finished.

A conventient way of telling when the reaction is completed is to take test samples at intervals until a specimen fully dissolves in pure chloroform. Another way is to examine small test specimens at intervals by polarized light using a microscope arranged with crossed Nicol prisms and a selenite plate so located as to give the most brilliant red field. The untreated fibers appear brilliant yellow against the red background. Completely acetylated fibers change definitely to a deep red or a deep blue depending upon the position of the fiber relative to the plane of polarization of the light. This characteristic change indicates a practically complete acetylation of the fiber, above 42% of acetyl in the ester. This method of examination enables the progress of the reaction to be studied, because the extent of the reaction in each fiber can be pjlainly seen. The time of the complete reaction varies widely, but even as prolonged a period as 366 hours at room temperature gives an undegraded product. Good products can, however, be obtained in much less time.

Thin films of cellulose derivatives. U. S. P. 1,688,457; Oct. 23, 1928. Arthur Eichengruen, assignor to Celanese Corporation of America.

14. The process for the production of thin films of cellulose derivatives, especially of cellulose ethers and cellulose esters, which consists in spreading a highy viscous or pasty solution of one cellulose derivative in a very thin layer upon a base comprising a material to which the dried film produced on evaporation of the solvent does not adhere even if said film be of extreme thinness, spreading a second highly viscous or pasty solution of a second cellulose derivative different to the first one upon said first layer, spreading a third highly viscous or pasty solution of a third cellulose derivative different to the preceding derivatives upon said second layer and repeating this operation with highly viscous or pasty solutions of other cellulose derivatives different to the preceding derivatives, thus producing any desired number of films of different cellulose derivatives upon each other on the same base, separating each film of each cellulose derivative as soon as possible after solidification and rolling them into endless bands.

Reinforced Hard Rubber. U. S. P. 1,689,570; Oct. 30, 1928. William B. Wescott, assignor to Rubber Latex Research Corpn.

In the manufacture of articles composed of or comprising hard rubber, the process which comprises admixing comminuted hard rubber, disintegrated partially cured rubber, sulfur, fiber and rubber latex, drying, molding and vulcanizing.

Polishing Surfaces of Cellulose Ester Compositions. U. S. P. 1,690,680; Nov. 6, 1928. Joseph E. Hirsh and Arthur D. Robson, assignor to Standard Varnish Works, New York.

The composition of the polishing

compound is adjusted in accordance with the character of the finish desired and the character of polishing operation, and also with reference to the composition of the lacquer being polished. In general a polishing compound including a diluent or a lubricant in predominating amount is employed. For example, for polishing a surface lacquered with a lacquer comprising 90 parts of pure cellulose nitrate and 10 parts of pigment, we have used a mixture containing 55 parts of linseed oil and 45 parts of commercial ethyl acetate (85%) together with an equal weight of finely powdered pumice stone. For polishing a surface lacquered with a lacquer composed of 100 parts cellulose nitrate, 20 parts of pigment, 40 parts of tricresyl phosphate and 20 parts of ester gum we have used a mixture containing 85 parts of linseed oil, 15 parts of commercial ethyl acetate and about an equal weight of powdered pumice. The process of the invention is useful for polishing both clear and pigmented lacquer finishes.

The polishing operation may be carried out in different ways. For example, the lacquered surface may be rubbed with a pad which is wet with a mixture of the softening agent and diluent or lubricant and then dipped in the abrasive before it is applied, or the polishing means may be supplied with the polishing composition in the form of a paste or suspension. The polishing composition may be removed as the polishing operation progresses, or the composition may be allowed to dry on the lacquered surface and subsequently removed and the surface subjected to a further finishing polish. The polishing operation may also be carried out with a buffing or polishing wheel to which the polishing composition is supplied and the operation concluded with a dry buffing or polishing wheel. The usual polishing methods can, in general, be used, although when carried out in accordance with the present invention the amount of time required may be materially reduced. Following the polishing operation, the surface may be waxed if desired in much the usual way.

Plastic from Jerusalem Artichokes. U. S. P. 1,690,648; Nov. 6, 1928. Edwin K. O'Brien, Charlottesville, Va.

1. As a new article of manufacture, a preparation comprising portions of the plant known as the Jerusalem artichoke reduced to a finely divided condition.

2. As a new article of manufacture, a preparation for fluid, partly fluid or plastic purposes, comprising portions of the plant known as the Jerusalem artichoke dried and reduced to a finely divided condition.

Pulp Mold. U. S. P. 1,689,555; Oct. 30, 1928. Felex Louisot, Hasbrouck Heights, N. J.

This invention relates to laminated molds for forming articles from plastic material, paper or other pulp and similar materials.

An object of the invention is the provision of means for expeditiously loosening a molded article from such a mold.

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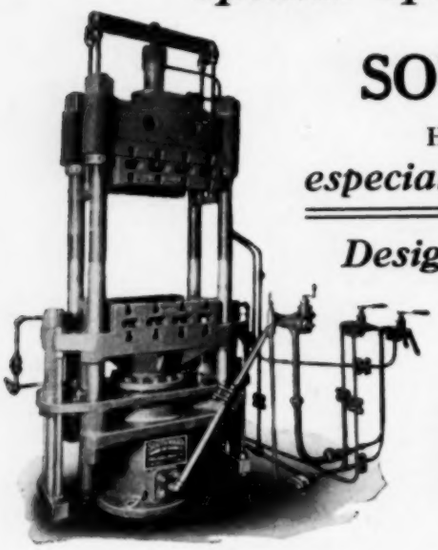

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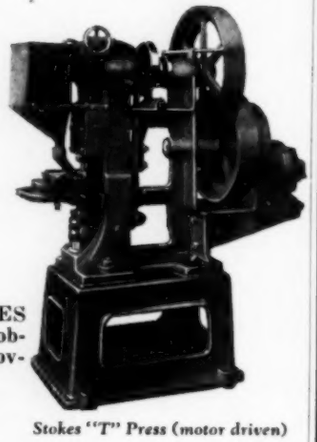
*Names on request.



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Light and the Resinoid Plastics

(*Continued from page 255*)

densing agent, except possibly a small quantity of meta and ortho cresol, resorcin, chlorophenol or other slightly acid substituted phenol derivatives. The product is washed thoroughly with water not hotter than 40° C. and then heated to above 150° C. but below 140° C. to get rid of the phenol and water, after which a further reaction with paraformaldehyde is allowed to take place. The latter part of this process is preferably carried out as follows:

"360 parts by weight of the purified resin are maintained at a temperature of from 25 to 40° C. with 190 parts by weight of formaldehyde solution of 40% by volume in a vacuum boiler placed in a water bath at pressures below 30 mm. until the distillation of the water ceases. It is then gradually heated to 70° C. until again no further distillation takes place. The water serving for the bath is then gradually heated to boiling point and kept at this temperature until the internal temperature of the boiler has risen to 88 to 95° C. The distillation then ceases almost completely and the mass can be poured into molds. In these molds it coagulates at a temperature of 95° C. after several hours and eventually can be heated to 110-130° C. for the purpose of completely hardening it. If heated higher the mass becomes somewhat brown."

In Patent 1,369,352 dated February 22, 1921 Pollak admits that even the products described in his prior patents have a decided tendency to slowly change color. He therefore suggests the following improved methods:—

Example I

"100 parts by weight of crystallized carbolic acid and 80 parts by weight of formaldehyde of 40 per cent, are heated under a reflux condenser with 0.2 parts by weight of sodium

phenolate until the condensation product is precipitated. The heavier resinous layer is separated from the supernatant aqueous solution and is shaken repeatedly with 100 parts by weight of water. The soap-like mass obtained is well washed with a solution of 10 parts by weight of methyl alcohol in 100 parts by weight of water and, afterward, with greater quantities of cold water, the residue is freed from the last traces of phenol by distillation in vacuo, is then filled in molds and, by heating at 95 to 120 degr. C., is converted into the infusible and insoluble product. The product obtained in this manner is colored a light yellow. It is transparent and air and light proof.

Example II

"By replacing the methyl alcohol employed in Example I by equal parts of a neutral 3 per cent. solution of hydrogen peroxid a somewhat darker product is obtained, which however is almost absolutely light and air proof.

Example III

"94 parts by weight of crystallized carbolic acid are heated to 85 degr. C. in an oil bath of 90 degr. C. 15 parts by weight of finely powdered alpha-polyoxymethylene and a quantity of 1/5 normal sulfuric acid sufficient to start an exothermic reaction and to cause the polyoxymethylene to dissolve are then added. Another 5 parts of alpha-polyoxymethylene are then added together with 1/5 normal sulfuric acid, until the reaction comes to an end. The fluid mass is freed from impurities by filtering off the latter and after having been washed repeatedly with 100 ccm. of water is mixed and shaken with a 0.3 per cent. solution of hydrogen peroxid. After standing for some hours the mass is repeatedly washed with water in order to remove the oxidizing agents. The intermediate product thus obtained can then be mixed with some fresh formaldehyde or polyoxymethylene and be converted into an absolutely light and air proof

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BAKELITE CORPORATION
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NEW YORK January 29th, 1929.

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Our salesmen carry one of these instruments, and we recommend that one of these pyrometers be made a regular part of the equipment in every plant where Bakelite materials are molded.

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Assistant Manager of Sales.

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The Bakelite Corporation's recommendations may well be applied to all hot molded products.

The Cambridge Mold Pyrometer was designed for rapidly and accurately measuring the internal temperature of molds used in the manufacture of bakelite, and other materials where definite mold temperatures are essential. There are few industries where this instrument will not prove of considerable value.

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insoluble product."

Other workers in this field who have made worthy contributions to the solution of this problem are:—Arthur Heinemann, Isidor Pollak, Erich Mohring, James Gibbon Byrom and Vaikunth P. Mekta. Their contributions can best be understood by comparing extracts from their patents with what has already been said.

Extract from Patent 1,441,981 to Heinemann

"According to the present invention the physical and chemical properties of these resins are stabilized by adding to the finished product, after complete elimination of water, suitable quantities of alkaline glycerates, for example sodium glycerate:—By this means the resin acquires a bright, constant colour, loses a large part of its brittleness, and becomes tougher, so that when used, for example, as a varnish, it may be bent without cracking. By the addition of a larger quantity sodium glycerate the melting point may be raised, and the solubility reduced or destroyed.

"For the purpose of the process the phenolformaldehyde resin free from water, is melted, and the requisite quantity of well dried sodium glycerate is added in a pulverulent state and dried sodium glycerate is added in a pulverulent state and stirred until it is fully incorporated and homogeneous mass is obtained.

"According to whethr the resin is to be more or less soluble and more or less soft, proportions of from 1 to 2% of sodium glycerate may be used; Larger proportions of sodium glycerate gradually induce an insoluble condition of the resin, in which however, it can still be melted."

A further detailed article on the problem of darkening will appear in the June issue.

Plastics in the Pulp and Paper Industry

(*Continued from page 262*)

November 16, 1909, it is stated that the pulp may be added to one or the other of the reagents before causing the chemical reaction, or to any intermediate reaction product. In Patent 1,302,209 to Perry, previously referred to, and in Patent 1,365,801 to Carter dated January 18, 1921, the resin is added to the pulp in the beater. In Patent 1,077,113 dated October 28, 1913, to Aylesworth it is suggested that the synthetic resin be dissolved in a neutral solvent such as acetone, alcohol, methyl alcohol, amyl acetate or mixtures thereof before incorporating the filler. This causes the filler to be impregnated with the resin and makes for a more homogeneous product. A variation in which the filler is first moistened with a hydrocarbon solvent for the synthetic resin before it is added to the resin is described in Patent 1,343,575 to Nash dated June 15, 1920. The solvent may be creosote oil or shingle stain oil.

Laminated Paper

Another method of incorporating synthetic resins and paper consists in embedding one or more layers of paper in the synthetic resin. Such a method is disclosed in Patent 1,192,833 dated July 25, 1916. Other similar methods consist in impregnating or coating several layers and uniting them by means of heat and pressure, as described in Patent 1,019,406 to Baekeland dated November 30, 1910 and Patent 1,150,642 to Stockhausen dated August 17, 1915. Laminated paper made by some of the above methods is on the market under trade names such as Dilecto, Micarta and Bakelite Laminated.

The material, laminated or unlaminated, may be in the form of sheets or may be made into rods, bars and even cylinders. See Patent 1,083,264 to Baekeland dated December 30, 1913 and Patent 1,137,373 to Ayles-

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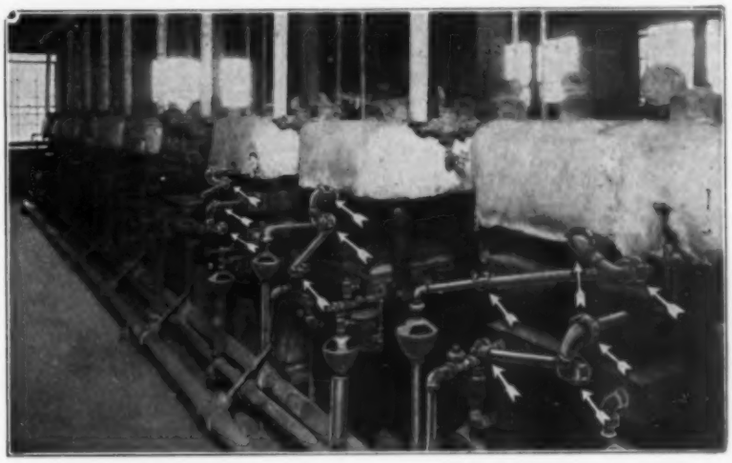
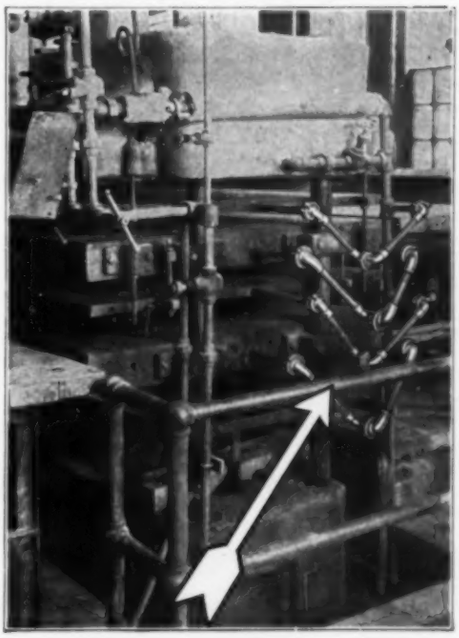
of maintaining flexible steam-line piping. Made of high quality steam brass absolutely rust proof and will last for years. They are particularly adapted for making the steam (or water) connections between platens on hydraulic molding presses. Their patented design insures a full and unimpeded flow of steam irrespective of the movement of the plates—a big factor in maintaining even temperatures so essential to perfect molding. Get the facts; then order from your regular supply house or direct from us.





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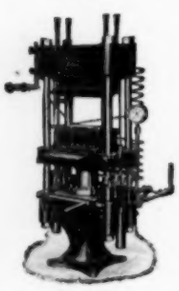

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worth dated April 27, 1915. But whatever the method of incorporation and whatever the shape of the resulting material, the product is always found to possess properties adapting it to uses and applications never contemplated for any of the raw materials.

Applications of the Synthetic Resins

The versatility in properties, chemical and physical inertness as well as the ease with which these materials can be molded rapidly and with extreme accuracy to unchanging shapes and dimensions, have brought forth endless applications in diverse fields. Continued research is gradually developing increased mechanical strength and resistance to shock, greater resistance to heat, water and chemical agents, so that the synthetic resins are rapidly reaching an industrial prominence, scarcely contemplated in prior years. In many fields, such as the automobile industry, they serve to the practical exclusion of other materials. An idea of the countless number of possible applications of these materials may be gotten from the fact that they are being used for attachment plugs, commutators, containers for chemicals, crank and lever handles, distributor heads, door handles and knobs, gear shift balls, instrument boards, lamps, switch bases and boards, and new applications are being developed almost daily. Hence it is not surprising that some authorities have prophesied that in a few years automobile and aeroplane bodies will be molded from laminated materials containing synthetic resins.

Of course it does not necessarily follow from what has already been said that paper materials will be exclusively used as fillers in the future. In fact in many of the applications given in the above list, other materials such as shredded textile material, wood flour, graphite and even asbestos are used to adapt the product for many specific purposes for which it

otherwise would not be suitable. But that does not detract from the indisputable fact that the combination of paper and synthetic resin, be it in a molding composition or in a laminated product, has many valuable characteristics not possessed by either of the constituents.

Possible Use of Molded Synthetic Resins for Parts of Paper Apparatus

The thought has occurred to the writer, as it has no doubt to many others, that the phenolplastics such as Bakelite, Celoron, Durez and Durite are suited on account of their physical and chemical inertness to take the place of other materials used in paper machinery. That the present material, cold rolled steel, out of which most agitators are made, is entirely unsatisfactory has already been indicated by Special Inquiry No. 116 sent by the Secretary of the Technical Association of the Pulp and Paper Industry to all the members of the Association. The fact that there is a large amount of alum and chlorine in the stuff chests renders the problem a difficult one as most metals readily corrode and discolor the paper. Inquiries sent by the writer to a large number of the leading molders and manufacturers of artificial plastics have brought back the information that special phenolplastic materials have been developed which meet the specifications required. In this connection it is interesting to note that the Meadows washing machine is equipped with an agitator or impeller made of Bakelite protected by Reissued Patent No. 16,743 to Rocke dated September 20, 1927. Instead of molding the propeller out of a synthetic resin, it has been suggested that a coating of phenolplastic varnish would serve the purpose. The drawback with this expedient is that all coatings wear off by abrasion, no matter how resistant to chemicals, and frequent renewals would be required.

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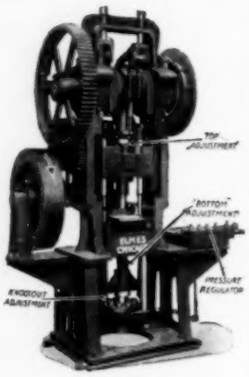

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Charles F. Elmes Engineering Works, 1002 Fulton St., Chicago, U.S.A.

Chemists Create Plastics

(*Continued from page 250*)

Hard rubber has been used to a great extent, but it is relatively expensive and by no means easy to work with. It is our belief that the use of plastic materials, and especially of the resinoid type is at hand.

The advent of glass-clear amino plastics that transmit ultraviolet light practically as well as quartz, but which can be cut, drilled and machined opens up a new line of possibilities. Lenses can be formed of these materials and they may, therefore, be used in ultraviolet spectroscopy or photo-micrography. Many of the modern resinoids are useful for making vessels that resist acids that attack glass, and their use, therefore, for containers of hydrofluroic acid is indicated.

Germany, the cradle of modern chemistry, is apparently leading in this regard. The material known as Haveag has recently been placed on the German market for the purpose of shipping containers for acid, as described in our April issue.

It is our understanding that entire tank cars have been lined with this material, which is said to be a mixture of resinoid and asbestos so that hydrochloric acid is so shipped instead of in glass carboys.

Another important use for plastic materials in the Chemical Industry is for housing thermometers, especially for the registering type. How many of our chemical friends would welcome a recording thermometer housing case which was not subject to constant corrosion of the acid fumes from the average large chemical plant!

Laboratory equipment and furniture generally that would not require constant varnishing and polishing certainly presents a splendid field for the enterprising manufacturer who desires a new outlet for plastic products.

It is the aim of Plastics and Molded Products to be on the alert for new ideas not only in the production of these materials, but to increase their use in all Industries.

Technical Abstracts

Fabrics coated with layers of pyroxylin plastics formed in situ. U. S. P. 1,690,426 and 1,690,427; Nov. 6, 1928. Norman E. Oliver, assignor to Hermetite Corporation, New York.

(a). In a process for coating a pervious material, first subjecting said material to mechanical treatment whereby the openings or interstices therein are reduced in size and the fibers are flattened to enhance smoothness of the surface, then applying to the surface of one side of said material a solution containing approximately 100 parts of nitrocellulose to over 60 parts of tricresylphosphate and forming a pliable layer coating which does not permeate and embed the fibers, and then drying said coating to produce the finished product.

(b). In a process for coating a pliable pervious material, first subjecting only one side of said material to a treating step which closes or reduces the size of the intersticies or pores thereof, and then applying to the other side of said treated material a coating material of the class comprising cellulose, celluloid compounds or mixtures, lacquers, varnishes or the like, which will remain pliable in the coating and produce at said coated side a finished surface retaining the pliability and appearance of the previous material.

Binder for plastic materials made from blood (hemoglobin) and rubber latex. U. S. P. 1,689,581 and 1,690.150.

(a). In the manufacture of composite articles bonded by rubber derived from latex the process which comprises adding hemoglobin and zinc oxid to latex, thickening the mixture by the action of said zinc oxid on said hemoglobin and thereafter incorporating other materials intended to form the body of the final article.

A plastic composition containing the product of reaction between hemoglobin and zinc oxid.

A plastic composition containing the product of reaction between hemoglobin, formaldehyde and zinc oxid.

(b). As a new material, stabilized latex containing blood proteid.

Sulphur-phenol resins. U. S. P. 1,690,-160 and 1.690,335; Nov. 6, 1928. Carleton Ellis, Montclair, N. J.

(a). In the present invention a quantity of sulphur not less than the amount of phenol is taken, and generally I prefer to use sulphur considerably in excess of the weight of the phenol. Thus 50 parts by weight of ordinary phenol, 80 parts sulphur and from about 1 to 10 parts of potassium carbonate are heated to 135-140° C. for about 4 hours and the temperature raised to 160° C. for another 4 hours. During the heating, reaction takes place with the evolution of hydrogen sulphide. A hard resin results having no very sharp melting point but slowly liquifying in the neighborhood of 130-140° C. By varying the proportions of sulphur the melting point may be modified.

(b). Example 1—100 parts by weight of sulphur monochloride was slowly added to a mixture of 150 parts of toluol and 100 parts of tar acids of which 50 per cent boiled above 212° C. During the addition of the sulphur chloride the reaction mixture was stirred constantly. The solvent was then removed by distillation and steam was blown into the resin while the latter was heated on an oil bath at 140-150° C. A clear hard resin was obtained with a melting point of 91.5° C. according to the ball and ring method. The resin was melted together with sulphur in the proportion of one part of the former to three parts by weight of the latter. The composition on cooling was uniform, did not separate nor crystallize. By the ball and ring method the melting point was found to be 105° C. Thus the melting point of sulphur was reduced approximately 15 degrees by incorporation with the resin.

The resinated sulphur prepared in this manner from 3 parts of sulphur and 1 part of sulphurized cresol and xylenol resin may be admixed with asbestos fibre, china clay, powdered mica and similar fillers or with wood flour, cedar dust or chips, and the like to make compositions which can be molded on hot pressing.

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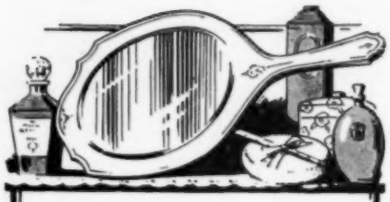

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Vol. 3 MAY, 1929 No. 5

Lumarith--A New White and Light-Colored Powder

The Celluloid Corporation announces the arrival of a workable cellulose acetate molding powder which the industry has awaited for many years

IN direct proportion to the increasing public demand for new colors and new styles, manufacturers have increasingly demanded a new material. What are the qualifications?

First: This material must be easily molded.

Second: It must be available in all fashionable colors, both translucent and transparent.

Third: It must be practically non-inflammable.

To discover, perfect and produce such a material at a reasonable cost was no easy job. Therefore, it was natural that the Celluloid Corporation — recognized as a pioneer in developing new materials—should undertake this difficult task.

The intensive years, which have been devoted to research and experimentation have resulted in the new composition—Lumarith, a cellulose acetate molding material, answering satisfactorily all the various requirements of the molding trade.

Articles molded from Lumarith, it is claimed, have the desired characteristics of toughness, extreme plasticity, unlimited shapes and infinite color effects plus an unsurpassed ease of mechanical operation in production.

The following gives a brief summary of the essential facts concerning Lumarith. They will undoubtedly yield the answer to many problems that have confronted molders interested in cellulose acetate during the past few years. For now, at last, the long sought material, a commercially practical cellulose acetate molding powder is available for use.

Manufacture and Composition

"Lumarith" molding composition is made by colloiding cellulose acetate with suitable plasticizers, pigments and solvents. The colloidalization or jelling insures a thorough homogeneous, tough and plastic mass, in which the colors or pigments are uniformly and very finely dispersed.

The manufactured material, which can be made in many forms, leaves the Celluloid Corp. factory in a truly finished state. The product does not require special treatments, such as a "hardening bath", curing, or subjection to very high temperature to complete any condensation or polymerization reactions that may be necessary. The molder employs heat merely to mold into the desired shape and need not concern himself with any reaction changes. Any scrap or flash from the molds is reworked to advantage, thus eliminating wastage. Depending upon the molder's skill, an infinite variety of color effects are possible.

"Lumarith" molding material is supplied in the form of slabs, chips or powder.

Sheets, rods and tubes are also available and these may be used very successfully for veneering plain colored molded articles to create novel and decorative effects. These possibilities lead the molder into a field of very artistic creations, not possible with other molding materials. As an illustration, scrap

of any color or colors can be molded into slab form, covered with Lumarith sheet material in any desired color and the article molded in one operation. The unlimited possibilities of producing new and attractive color combinations and effects are apparent. This feature of scrap utilization, coupled with coloration possibilities, constitutes one of the outstanding and much desired virtues of our molding material as constrasted with others.

Types of Material

To answer the demand for various types of material Lumarith molding composition is made in hard formula, normal formula and soft formula. All three types can be supplied in transparent, translucent and opaque colors.

The hard formula, as is to be expected, is somewhat stiff in character and is intended more or less for articles of heavy gauge, where pliability or softness can be sacrificed to excessive hardness. For example, handles, trays, insulation parts, etc. are produced with satisfactory results using the hard formula.

The normal formula, while not as hard, is tougher and can be made in thinner gauges without the danger of cracking. This type is intended to answer the average needs of the customer.

The soft formula has been developed to permit greater ease in molding and where it is necessary that the material should stand a certain amount of bending.

Lumarith also rapidly lends itself to any other formula modification to suit the customer. For example, special fillers can be introduced, if necessary, to obtain any desired characteristic.

Molding Procedure

The Celluloid Corporation states that the molding procedure for Lumarith is the same as that in general use for phenolic or gum base materials, such as shellac.

Depending on the form of Lumarith material used, the material may or may not be preheated, since the mold is heated.

As Lumarith molding material is remoldable it is necessary to cool the mold, to a certain extent, the amount of cooling depending on the thickness of the mold and the molded article.

The amount of heat or steam pressure necessary to mold Lumarith does not have to be altered from that now in general practice in the molding industry. The lower the heat or steam pressure the longer the cycle. Lumarith has been molded with 40 pounds steam pressure and also with 170 pounds steam pressure.

The hydraulic pressure necessary is also optional. Lumarith has been molded in bronze molds with no pressure showing on the pressure gauge and again a 4000 pound pressure has been used, the full pressure in use in some of the molding plants where Lumarith is now molded.

Properties of Lumarith

The properties of Lumarith, of course, are largely dependent on the formula used, and since the character of Lumarith is such as to allow a wide adaptation, the physical and chemical characteristics will naturally vary accordingly.

The figures given are representative of the average material used, and changes can be introduced to make a molding powder to meet particular requirements.

a, Specific Gravity, Molded
1.29 transparent
1.56 pigmented

b, Tensile Strength 2500-5000 lbs.

c, Compressive Strength 10,000-15,000 lbs.

d, Transverse Strength 6-8,000 lbs.

e, Dielectric Strength 450-700 volts per mil.

Lumarith may be molded with steam pressure up to 175 lbs. (375° F). Lower temperatures naturally require longer cycles. Heat and light resistance are both very good, there being no discoloration below 300° F. Articles made from Lumarith may be subjected to the various mechanical operations that are customarily employed in finishing. These include sawing, drilling, threading, polishing, cementing, engraving and the like.

The variety of articles that Lumarith molding powders may be used in producing is limited only by the ingenuity of the designer. The Celluloid Corporation states that it is applicable practically in all instances where resinoid or similar molding compositions are now used. These include the following fields:

1. Electrical Insulation
2. Mechanical
3. Ornamental

Specific instances cover switch plates, buttons, dental parts, cutlery handles, phonograph records, medical appliances, musical instruments, automobile parts, novelties and toys, sanitary and toiletware, electrical fittings, museum specimens and others.

Lumarith molding powders are manufactured under the numerous patents owned or controlled by the Celluloid Corporation, which have been issued to them over a period of many years.

Among the salient features that characterize Lumarith powders are that it is slow burning and practically non-inflammable, odorless, tasteless and sanitary. It is impervious to oils, light in weight but mechanically strong. The waste or flash is thermoplastic and may be reworked, thus eliminating waste. Objects may be formed by extrusion of the heated material into cold molds from which it may be withdrawn with complete reproduction of the finest details.

The Celluloid Corporation intends to put its staff of chemists and engineers at the disposal of the molding trade in order to bring this new material to peak of its possibilities in the arts and industry.

The Pyroxylin Plastic Industry In Light Of Tariff Legislation

A resume of Tariff Acts from 1883 to date and their bearing on imports of stock material and finished articles

By Nicholas Klein
Editor, Molded Products

THE pyroxylin plastic industry is a native American development built up since the early 1870's to a point where to-day the value of its completely fabricated products is $60,000,000 annually. During these fifty odd years, with all the numerous complex considerations that have helped and hindered the growth of the industry, it now represents a depreciated investment of $20,000,000 in equipment for the manufacture of sheets, rods and tubes alone, without counting in any of the very considerable equipment in operation for fabricating finished articles, the value of which was mentioned above. At a moment when Congress is considering a new tariff bill for the further protection of this industry, a resume of the effects on the industry of earlier tariff legislation is assuredly most timely.

For a number of years after the pyroxylin plastic industry was established in this country, there was no foreign competition. This was quite obviously due to the fact that production abroad was practically non-existent. In 1883, however, the industry felt it required protection, at which time a duty of 60c per pound plus 25% ad valorem was placed on imports of finished or partly finished pyroxylin products. This rate was maintained until 1894. Then, during the Cleveland administration, the tariff was scaled downward in the Wilson Act. The duty on finished articles was reduced to 45% ad valorem. This change was reflected in the volume of imports, which immediately jumped more than four-fold. In 1897, however, the duty was re-established at the higher rate, and was maintained at a consistently high level until 1913. The statistics of pyroxylin plastic imports covering this period, as compiled by the Department of Commerce are rather curious. The imposition of the higher rate is reflected in the drop in imports between the years 1898 and 1906. In 1908 and 1909, however, they mount to figures well over a million dollars annually. The high tariff of 1909 again acted as a restriction and imports fell to levels ranging between $100,000 and $300,000 annually, from 1910 until 1913.

Then, with the return of the Democratic Administration, the rate of duty was dropped to 40% ad valorem. The foreign producers made elaborate plans to more effectively enter the American market, a German manufacturer even going to the extent of erecting a warehouse in Leominster, the centre of the pyroxylin plastic fabricating industry. For the year ending June 1914, imports rose to a value of $521,175 for finished articles and $59,370 for sheets, rods and tubes, figures for which latter had previously been comparatively insignific-

Imports for Consumption of Pyroxylin Plastic Products Department of Commerce.

Year	Sheets, Rods, & Tubes.	Finished and Partly Finished Articles
1893	.....	$ 57,062
1894	.....	96,977
1895	.....	371,873
1896	.....	337,862
1897	.....	262,676
1898	.....	160,836
1899	.....	249,619
1900	.....	378,583
1901	.....	277,461
1902	.....	213,663
1903	.....	178,144
1904	.....	240,501
1905	$ 390	162,779
1906	322	270,547
1908	3,991	1,868,180
1909	1,174	1,140,887
1910	2,577	333,957
1911	2,270	129,112
1912	2,641	184,819
1913	18,834	267,502
1914	59,370	521,175
1915	30,161	340,722
1916	3,322	123,028
1917	604	52,979
1918	4,489	44,846
1919	6,217	51,340
1920	14,210	110,843
1921	41,990	109,752
1922	54,284	264,232
1923	45,244	1,395,299
1924	26,341	1,531,076
1925	47,220	1,711,076
1926	157,163	2,686,696
1927	134,946	2,586,979
1928	121,475	2,583,723

Extracts from various tariffs to 1922

Tariffs	Collodion etc.	Blocks, sheets, Tubes, etc., Unpolished	Sheets, etc., Polished, partly & wholly finished articles, etc.
1883	.50 Lb.	$0.60 Lb.	.60 & 25% ad val.
1890 (McKinley)	.50 Lb.	.60 Lb.	.60 & 25% ad val.
1894 (Wilson)	.40 Lb.	.50 Lb.	45% ad val.
1897 (Dingley)	.50 Lb.	.60 Lb.	.65 & 25% ad val.
1909 (Payne-Aldrich)	.40 Lb.	.45 Lb.	.65 & 30% ad val.
1913 (Underwood)	15% ad val.	25% ad val.	40% ad val.
		Polished & Unpolished sheets, rods, and tubes.	Articles.
1922 (Fordney)	.35 Lb.	.40 Lb.	60%

ant. The outbreak of the World War at this point, however, wrought great changes in the entire industry; plants throughout the entire world and especially in Europe, turned over their equipment for the production of one type or another of war munitions.

World War Halts Imports

During the World War, Germany was obviously forced out of the running as far as being a competing factor in pyroxylin plastics was concerned. This served as an impetus to the Japanese, who were the second largest exporters to the United States previous to this time. Throughout the war years, and immediately thereafter, imports into the United States were very low. This was accountable to the fact that European production was demoralized due to the disordered economic conditions abroad, and Japan's concentration on the European market. By 1922, however, European production had recovered and was prepared to export again. Japan's trade with Europe was curtailed to that extent so that both factors re-entered the American market with an ever-increasing value of imports until in 1928 the total for finished and partly finished articles was $2,582,723.

The records of importations into the United States show that even during the periods of the highest tariff rates, large volumes of importations have been brought in. Particularly in the case of Japan the present status of imports shows that under the existing tariff rate the advantage lies with the Japanese product rather than with the "protected" American product in all cases where price is the deciding factor.

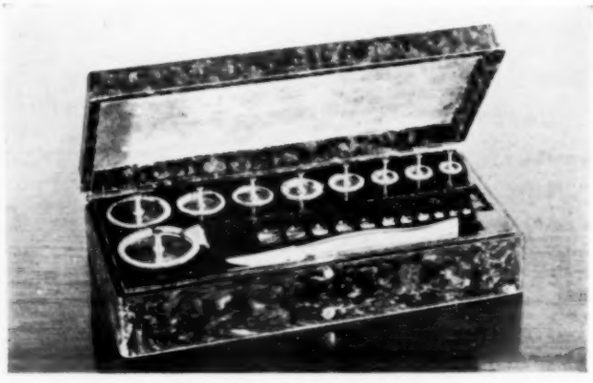
The raw materials which enter into the production of pyroxylin plastics must be considered, too, as having a bearing on tariff legislation to keep out foreign products.

The basic raw materials in the manufacture of pyroxylin plastics are cellulose, usually in the form of cotton; sulphuric and nitric acids; camphor; alcohol, pigments, dyes, etc. So far as concerns the raw materials themselves, the costs in the different manufacturing countries do not vary very extensively. The United States is in a favorable situation as regards cotton, which, however, has been partly offset in Germany by the development of wood pulp as a substitute. As regards camphor, Japan has always occupied a favored position, and until the past few years an unchallenged control. Not only is practically all of the world's supply of natural camphor produced in Japan and the Island of Formosa, but the distribution of this camphor is a Government monopoly. While this monopoly has not been extremely oppressive as a rule, there can be no question but that they have maintained prices at an artificial level. Within recent years Germany has developed the synthetic camphor production upon a commercial basis. The American celluloid manufacturers have been very large customers of the German synthetic camphor factories, and while this competition has unquestionably been favorable to the American celluoid industry by freeing them from the necessity of relying upon a single source of supply, it is also true that the camphor business has been an attractive one for the German manufacturers.

Specialty Trade Important

In a discussion of tariff upon pyroxylin products, the commodities of greatest importance in international trade are the fabricated articles such, for instance, as toys, dolls, combs,

(*Continued on page 300*)



The analytical chemist will delight in this new molded Bakelite weight box in smartly contrasting mottled colors.

These light-colored articles were molded out of Aldur by the Insulation Mfg. Co., Inc.

New Resinoid Powder Used For Molding Light-Colored Novelties

Aldur, recently developed Urea-Formaldehyde product, is found readily moldable in a wide variety of light and bright-colored translucent effects

THE subject of color, particularly lighter and brighter colors in molded products, hardly requires any lengthy introduction at this late date. The industry admits it is anxious to receive with open arms any practically workable molding powder that is consistently supplied to match sample lots. This is best borne out by the molders' willingness to give each new comer in the market a thorough test in order to find the material that will satisfy the buying public's demand for light colored articles.

One of the newest developments in the sphere of light colored molding powders is Aldur, manufactured by the Luco Products Corp. of Brooklyn. This material shows excellent possibilities of solving the problem of providing a composition that can be molded to form light colored, translucent articles. The consensus of opinion seems to be that even reds, greens, blues and violets on a translucent base are much brighter than when opaque colors of the same shades are used. The translucent Aldur base, without the addition of any pigments or dyes, is a cream white, for which complete stability is claimed. This seems entirely plausible since the resin itself is a urea-formaldehyde condensation product which is water-white and free of the yellowish tinge that is characteristic of the phenolic resins.

Aldur, in its wide range of color possibilities, lends itself to the molding of a host of articles. The pieces illustrated here, molded by the Insulation Mfg. Co., of Brooklyn, are examples of what has been actually done beyond the purely experimental stage. These black and white reproductions, though, hardly do the actual colors justice. The inkwell stand is molded cream-white translucent Aldur. The walls of this piece are extremely thin, about one-eighth inch, with many sharp corners throughout, yet no trouble in flowing was encountered during the molding operation. The ash receiver is a composite red, green, violet and cream affair about three inches deep, entirely translucent; its surface perfectly smooth and glossy after its removal from the mold. A piece which adequately proves the molding properties of Aldur is the handsomely mottled Game-Well card case. This box, which is made to hold two decks of bridge cards, is designed as a miniature fire-alarm box, with considerable engraving on its face and top. It is about four inches deep, with walls about one-eighth inch thick, and has a partition down the center to separate the two decks of cards. In the Aldur molded article, all

the corners, edges and engraving are reproduced with knife-like sharpness and precision, adequate proof of the moldability of the material.

In fact, Aldur presents no new problem in molding. The technique is quite similar to that in practice with the various phenolic resins. Molding is done in ordinary steel molds, plating not being essential. Steam pressures varying between 60 lbs. and 100 lbs. are suitable while molding pressures between 2000 and 3000 lbs. per square inch have been found to be satisfactory. The powder, apparently is not at all temperamental so that considerable temperature and pressure latitude is possible without much risk of failure to obtain consistently well molded articles. There is one point that the molder must bear in mind when using Aldur, or in fact any light colored molding powder. The press must be kept out of the range of flying particles of the darker powders in order to keep the light colors free of contamination. Where mottled effects are being molded this is not so serious, but where straight light colors are being used, regardless of the nature of the powder, the presses are generally isolated.

Superior strength is claimed for molded Aldur, which in turn permits economies in the amounts of powder required for a particular article. The manufacturers state that the walls of a molded piece may be one-third of the thickness required with other commonly used molding materials and still possess the same mechanical strength. Another advantage in designing thin walled objects is that the translucent effects show up to better advantage, also these thin-walled molded pieces appear to possess much greater flexibility than is generally expected of molded resinoids.

Aldur powders will undoubtedly find application in a wide variety of novelties where they will displace wood, metal and glass and act as another influence in the ever-increasing trend to substitute new synthetic materials for these older working media. The few articles illustrated here are just a minute proportion of the possibilities a white and light-colored, translucent molding powder possesses. The possibilities of its influence in the industry may prove tremendous and as such it deserves a warm welcome.

Card-case molded in Aldur showing clear-cut engraving on face.

San Duro Toilet Seat an Example of the many Applications of Molded Products

THE new San-Duro toilet seat of DUREZ is lightly designed, it is exceptionally strong. It is made in colors to harmonize with the color schemes of the modern bath rooms.

The manufacturers of San-Duro seats of course, claim that they have unusual sanitary advantages. Resinoids such as DUREZ are repellant to flies, are non-porous, non-flammable and acid and water resisting.

The seat is molded of one piece. There are no seams or joints, no place to harbor germs, it will not warp or crack, its surface is not a surface coating but part of the material itself. It therefore, can not readily chip or crack off.

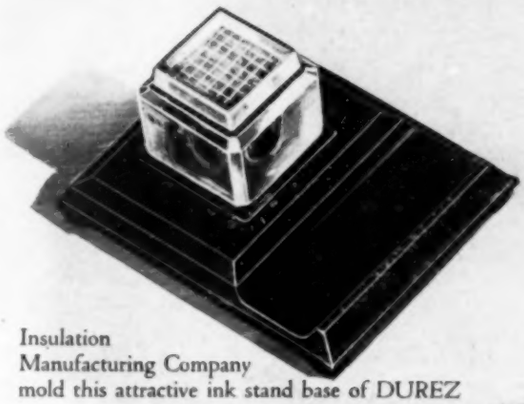
The hinges are also of molded DUREZ so that there are no visible metal parts to corrode and tarnish.

The San-Duro seat has a high permanent gloss finish and is easily kept clean. Its manufacturers, the Phenolic Products Corporation of Rockford, Illinois, guarantee it to last a lifetime and have made such notable installations as the twenty-story State Bank Building, the Medical and Dental Arts Building both of Chicago; the Hotel President at Kansas City and the Fisher Body Plant of Flint, Michigan; as well as other equally representative installations.

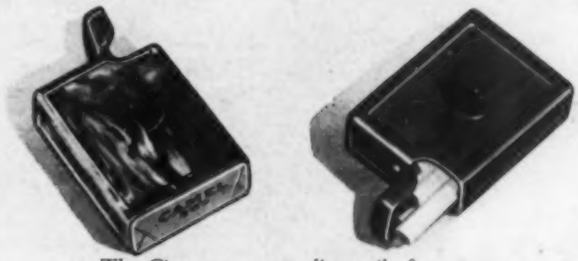
NOVELTY IN THE NOVELTIES

Norloc Bridge Table Set
One of the new numbers of the Norton Laboratories

Barrel Savings Bank
To catch the Kiddies' Pennies
Molded of DUREZ



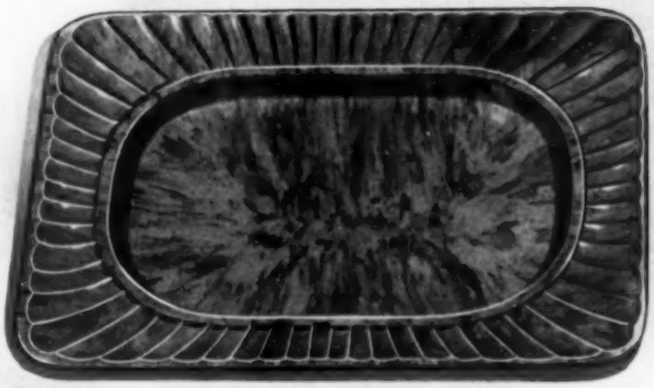
Insulation
Manufacturing Company
mold this attractive ink stand base of DUREZ



The Cigarettes you walk a mile for
may now be protected by this compact case.

This compact little box carries
your aspirin, quinine, etc., in its six separate
compartments—A Colt Novelty.

The busy executive may now have his individual memo stationery, a Brown & Bigelow convenience. The molded base is of red and black DUREZ



The graceful lines and the beautiful
combination of colors, make this molded tray
an object of art as well as utility.

The non-refillable-bottle cap of
Orange DUREZ, crowning a
Green bottle is very striking.

Photographs, courtesy of General Plastics, Incorporated

Catalin-Lined Telephone Booths Find Place In Architecture

New York Telephone Co. exhibits booth with resinoid linings harmonious with modern building interiors

ONE of the most recent and effective uses of Catalin, that translucent plastic which so readily lends itself to striking and unusual color treatment, is in making the modern telephone booth an object of beauty, as well as of utility.

For many years the average telephone booth has remained scarcely more than a piece of furniture, frequently out of harmony with the building interior, and often cramped by space limitations. But with the growing appreciation of the telephone's indispensability in the present-day scheme of things, the telephone booth is being brought out of its dark corner, and given its proper place in the architectural sun.

Today an ever-increasing number of architects and builders are making adequate provision for public telephone facilities by incorporating telephone booths of ample size and attractive design in the original building plans. Outstanding among these special booths of the so-called built-in type are those lined with Catalin, which gives them the luxurious character of marble at a cost far below that of the original stone. Harmonizing to a marked degree with their environs, these new booths are accorded an almost conspicuous place in the design of the building.

Displayed at Show

Some examples of this type of built-in telephone booths were recently displayed by the New York Telephone Company at the Architectural and Allied Arts Exposition held at Grand Central Palace, New York City. In addition to being lined with panels of sheet Catalin, the exterior of each of these booths was trimmed with walnut in natural finish. The booths were well lighted and ventilated, and provided with comfortable seats upholstered in leather. The shelf on which each coin telephone was mounted was also covered with Catalin. Booths of this type are slightly larger than the portable type of structure commonly used.

The Catalin sheets used in lining the compartments were a quarter of an inch in thickness and 12x14 inches in area. These sheets are attached to the wooden walls of the booth from the back by means of machine screws, the plastic material being tapped for this arrangement.

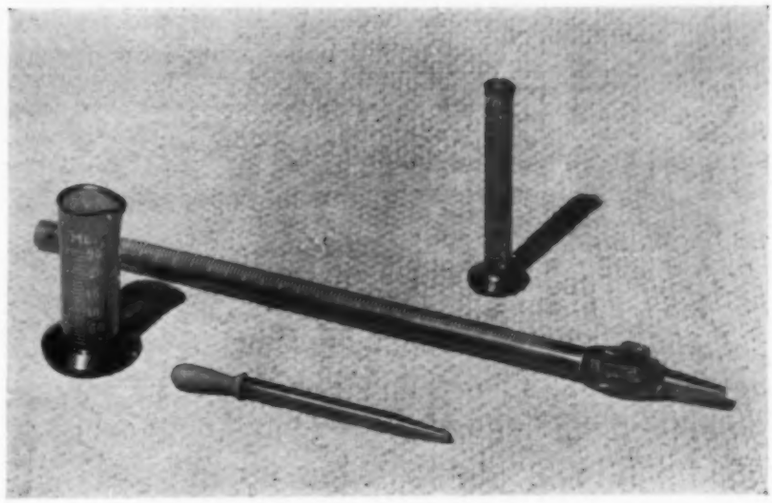
Aside from creating desired

harmony and beauty, the Catalin-lined booths are easily cleaned and meet the requirements of sanitation. Also, the plastic material does not lend itself very readily to defacement or mutilation, which is a distinct advantage.

While the designing and planning for such public booths is done by the architect, the engineers of the telephone company co-operate with them fully to the end that all the requirements of proper telephone construction are met.

Catalin creates a color effect which cannot be readily duplicated in the moldable phenolic resins. It is used to advantage in making numerous articles, but in no instance could it seem to have greater opportunity of acquainting the public with its beautiful appearance and practical utility than in the case of the new type of telephone booth.

Close-up of Catalin-lined Booths



Bakelite Laboratory Ware Resists Corrosive Reagents

The use of Bakelite transparent apparatus in the chemical laboratory has resulted chiefly from the ability of phenol resinoid material to withstand the attack of hydrofluoric acid. It will be remembered that hydrofluoric acid is used in the etching of designs on glass. In the making of ornamental designs, custom has been to protect the surfaces which were not to be frosted by applying a coat of paraffin. Thus, at the discretion of the artist, selective etching was achieved.

Relying on experience of etchers of glass, chemists have for many years protected glass apparatus from hydrofluoric acid attack by coating it with paraffin. Frequently, we will still find these bottles that have been coated inside and out with paraffin—also the stopper. It will be realized that the result is a bit clumsy and none too convenient to handle, but the special objection lies in the factor of the opacity of the resulting structure. In other words, the chemist cannot see the level of acid in the container except, partially, by holding it to the light.

Bakelite material is by no means a general replacement substance for laboratory glassware. For the handling of hydrofluoric acid, it is probably the most effective material yet devised. Thus far the forms in which it has been most used include beakers, burettes, graduated cylinders, graduates, bottles, funnels, droppers, conductivity cells, etc.

Telephone-Dialer Pencil has molded head and body.

Attractive Mechanical Pencils Utilize Colored Molded Parts

THREE interesting new types of pencils, attractive in appearance and novel in design, have recently been placed on the market by the Autopoint Company of Chicago.

To keep pace with the steadily increasing use of the dial telephone, a new type of rotatable head telephone dialer-pencil has been developed. Two of the models are equipped with 14-inch chains for attachment to the telephone, thus making the pencil an integral part of the instrument, and insuring the convenient permanence of a satisfactory medium for operating the dial. The black lustre of the phenol resinoid material is in harmony with the enamel of the telephone—or, in the case of the new European type phone, with the handpiece itself, which is also an example of Bakelite molding. The new dialer line includes full-length and short pencil models and each style may be had either with pocket clip or telephone extension chain.

A new oversize pencil known as "the pencil which writes big business," is manufactured in both the molded and transparent variety of synthetic resin product. Several industrial concerns have standardized on this pencil, because of its strength, simplicity of mechanism, and lightness of weight. Bakelite materials retain their original lustre, and are not attacked by perspiration. These factors guarantee the attractive life of the pencil barrel. Pencils utilizing the transparent resinoid are mounted in 14-karat gold, and are produced in colors of amethyst, clear and cloudy amber, blue and green jade, ivory, rose, ruby, and sapphire.

A combination pencil equipped with writing lead and checking lead—thin and thick respectively—in a double tip barrel, is reported to have a definite appeal to draftsmen, engineers, architects, and others having to do with blueprints. Seemingly, it would be a useful tool to anyone who desires to check frequently with two colors. Molded Bakelite construction lends itself to the color scheme of blue and red, while the simplicity of mechanism coupled with lightness of barrel, gives the pencil a nice balance.

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885-20

GENERAL ELECTRIC

GENERAL ELECTRIC COMPANY, SCHENECTADY, N. Y., SALES OFFICES IN PRINCIPAL CITIES

British Material Used In Shaped Articles Without Pressure

A resinoid which can be cast and a new safety glass composition are mentioned in despatches from abroad

By A. C. Blackall
British Correspondent

A company has just been floated in London under the title of Metduro, Ltd., to acquire and exploit an invention relating to a liquid plastic substance to be known commercially as "metduro." This substance is the invention of Dr. Alfred Schmid, Professor of Physico-Chemistry at the University of Basle, Switzerland. Patents have been applied for and the benefit thereof is being acquired by the company, together with the right to apply for letters patent and any other protection in all parts of the world, except the United States.

The properties of metduro have been exhaustively investigated by R. P. Wilson, M. I. C. E., M. I. E. E., M. Cons. E., who reports that it can be molded into any desired shape without pressure and solidifies very rapidly under the action of a moderate degree of heat. The properties of the material are such that it is fireproof, waterproof, acidproof and oilproof, and has high insulating properties, and is, moreover, exceptionally strong. It can be easily machined, drilled and worked, and can be so molded as to take accurately screws of any thread. The appearance of natural woods, ivory and marble can be beautifully reproduced. When turned out of the mold the material requires very little, if any, further finishing or handling. In joining parts of an article molded separately out of metduro the material in its liquid form acts as its own adhesive. The molded articles retain their exact original shape and size under varied conditions of temperature and moisture without warping, shrinking or splitting. The constituents of the substance are cheap and readily obtainable in ample quantities. The process of manufacture and the plant required are extremely simple, and the material can be produced at a competitive price.

Metduro is suitable for application to a variety of trades and industries, such as:—

The electrical industry.—Manufacture of insulators and all types of fittings, such as switchboard panels, ceiling roses, telephone receivers, and all articles usually made from plastic materials under pressure.

The furniture trade.—Manufacture of complete bedroom suites, either with a lacquer finish or reproducing the grain and color of natural woods.

The material can also be used for making such miscellaneous articles as letterings for electrical signs, domestic lamps, etc. As it can be made translucent, it can be used in the manufacture of vases, jars and fancy articles of many kinds.

"It is the only material which can be molded cold," says Mr. Wilson, "and is at the same time non-inflammable, mechanically strong, an exceptionally good insulator, and is acid and oilproof. Its ingredients are readily obtainable at prices which, coupled with the extraordinary facil-

As modern in material and design as in method of coffee making. Handles of Black Bakelite molded offer a delightful contrast to the silvery sheen of this nickel finished Edicraft Siphonator.

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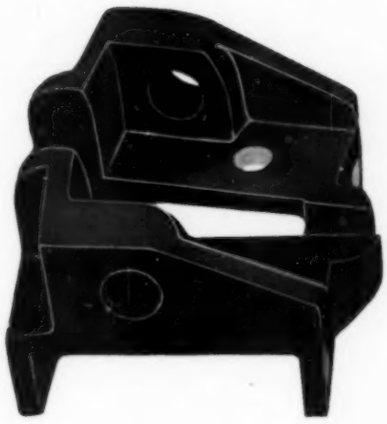

Its demands are then met with skilled uniformity. The products pictured here are only three of many molded for the Rayon Industry. They are examples of the quality and precision this exacting industry necessitates.

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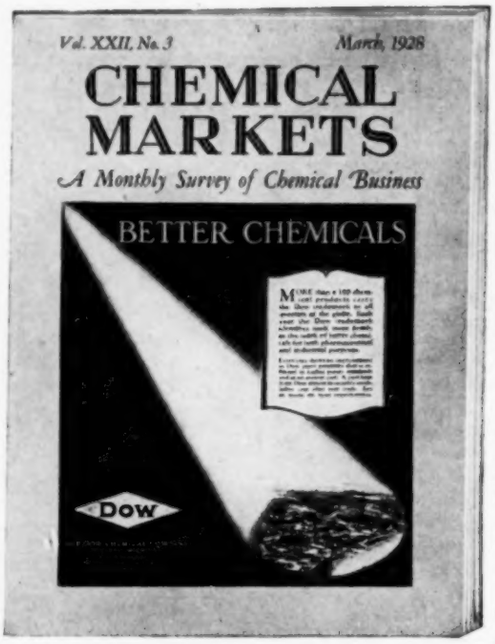

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ity of manufacture, enable it to compete very favorably both as to qualify and prices with any similar material on the market.

"The fact that any article can be molded without excessive temperature and without pressure puts it in a class entirely by itself. For electrical purposes I have no hesitation in saying that it has no equal, and it therefore follows that it has a practically unlimited field. For cabinets, furniture, etc., more especially for damp and tropical countries, it is as far as I know unique, because it is non-hygroscopic and cannot therefore warp or become distorted, and is, in my opinion, insect proof."

Factory Acquired

The company is acquiring a factory at Waltham Abbey, embracing about 24½ acres, containing 34 buildings of various dimensions. Large sums are being spent on plant and equipment in preparation for commercial production on a large scale.

The company has agreed to acquire from Metropole Developments, Ltd. the benefit of a contract between the latter and Professor Schmid, the inventor, for the purchase of the invention and the benefit of a service contract with the inventor for his services as chief consulting chemist for five years at a salary of £7,500 ($37,500) per annum. The company has a share capital of £700,000 ($3,500,000), divided into 550,000 participating culmulative preference shares of £1 each, participating in the profits up to 10 per cent, and 3,000,000 ordinary shares of 1s. each. An issue has been made to the public of 450,000 7 per cent cumulative participating preference shares of£1 each and 450,000 ordinary shares of 1s. each at par. Metropole Developments, Ltd. has the right and has bound itself to subscribe at par in cash for 1,660,000 ordinary shares, has undertaken to discharge the whole of the cash consideration of £27,000 ($135,000) payable to the inventor for his invention and also the whole of the five yearly instalments of his salary. After

payment of the purchase price of the plant and equipment, and the flotation expenses, the new undertaking will have available a sum exceeding £450,000 ($2,250,000) in cash, and in addition will have remaining for future issue 60,000 preference shares of £1 each.

The company is associated with the Metropole Gramophone Co., Ltd., phonograph and record manufacturers, and Everlite, Ltd., electric lamp manufacturers.

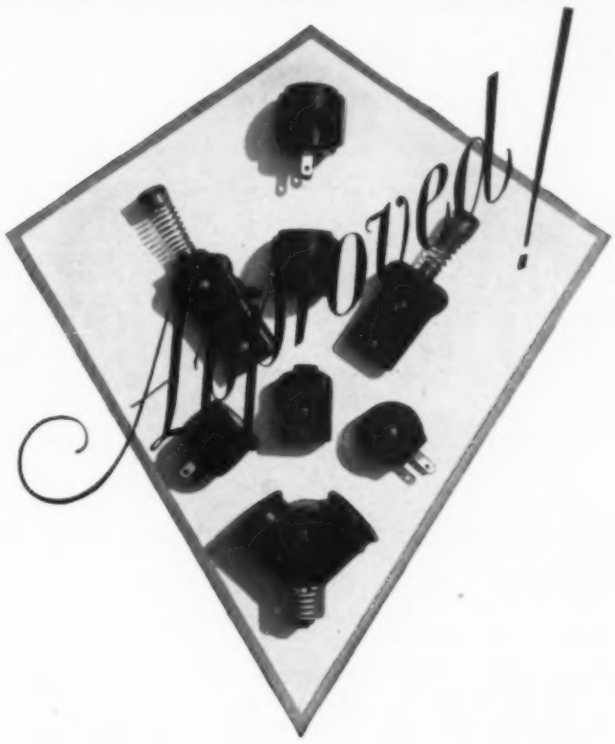
A New Safety Glass

Another new safety glass has just been patented in England. The glass is a compound substance, and is not only non-splinterable and non-discolorable, but also non-inflammable. It has been patented by Xetal Safety Glass, Limited, of Stapleford, Notts. It is now available for all those purposes in which a manufacture of this description can be used with advantage, such as automobiles, airplanes, ship lights, gas masks and goggles, jewelers' windows and show cases.

In appearance it is almost identical with ordinary glass. It can be made in any shape or size (within the limits imposed by the protective raw materials) and in any thickness, from that of the finest optical glass to that of bullet-proof glass.

The fact that "Xetal" is not made with the ordinary celluloid (nitro-cellulose) which upon exposure to the sun's rays becomes discolored even in temperate zones, and that it is not inflammable, are among the advantages claimed for it by its manufacturers.

Tests at Faraday House Testing Laboratory have been made of the new glass. Subjected to a powerful mercury vapor lamp for twenty-four hours, it showed no discoloration, although the temperature of the glass when under test was about 77.7. When service revolver bullets were fired at the glass at distances of ten and twenty-five yards the glass was pulverized to a depth of one thirty-second of an inch only.



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News of the Industry

Karolith Note

Of unusual interest in connection with the Chemical Exposition to be held in New York May 6-11, is the display of the Karolith Corporation. Karolith Corporation are manufacturers of Karolith, a casein plastic. Casein (Lactarene) is, chemically, a protein found in milk in the form of calcium caseinate.

Years of research made possible through the foundation of a fellowship of the Mellon Institute developed this modern raw material which is furnished in rods, sheets and tubes as well as completely molded parts.

Karolith is the first casein plastic made in the United States which can be molded.

On display in the Karolith booth are many unusual applications of this casein plastic. These examples of the casein plastic art will be of interest not only to chemists and chemical engineers but to production executives as well.

Austrian Casein Exports

Total shipments of galalith consigned to the United States from Austria increased 27 per cent in quantity and 25 per cent in value during 1928 over the preceding year. This increase was due to shipments which consisted principally of finished or partly finished articles, as will be noted below:

	Blocks Pounds	Value
1927	250	$150
1928	118	61
	Finished or Partly Finished Articles	
	Pounds	Value
1927	8,996	$22,197
1928	11,681	27,879

(Consul John B. Hurley, Vienna)

Commercial Solvents Gains

NET profit of the Commercial Solvents Company for the March quarter equalled $3.80 a share. Comparisons are:

	1929	1928
March quar net in.	$844,355	$575,726
Per share	3.80	2.64

Noted Publicist Comments on 'Plastics'

DR. EDWIN E. SLOSSON, the internationally famous scientific publicist is very favorably impressed by the strides the plastic industry has made and the part that Plastics and Molded Products has play in it. In a letter he says:

"I have been for many years much interested in synthetic plastics and approve the effort you are making to cover scientific developments in this field, in your periodical. The Declaration of Independence was no more important a step than the discovery of synthetic chemistry, which has freed the human race from economic dependence upon Nature. Man is learning to get what he wants in unlimited quantities.

"I hope to keep in touch with the progress of 'Plastics'. We shall doubtless find articles in it frequently, that we can broadcast through our newspaper syndicate or radio."

Edwin E. Slosson,
Director, Science Service.

Busk Joins Multi-Vider

JOSEPH R. BUSK, for several years account executive of Frank Seaman, Inc., is now general sales manager of the Ruxton Multi-Vider Corporation, with offices in the Graybar Building. The Multi-Vider is a combination calculating machine and automatic pencil that is uncanny in its operations.

Dibrell Resigns from Celanese

EDWIN P. DIBRELL, executive vice-president and director Celanese Corporation of America, Inc., has resigned his post, effective immediately. Mr. Dibrell was for seven years with Lord & Taylor, joining that concern in a minor capacity and leaving it as vice-president and divisional merchandise manager. Before joining Celanese he was for two years vice-president in charge of publicity R. H. Macy & Co., Inc. No plans announced for the future.

Keep Step With The Progress of

PLASTICS AND MOLDED PRODUCTS

For the year ahead, our editors and contributors promise a wide range of reliable articles on the uses and sales, the history, technology and development of American and Foreign plastics.
Helpful articles from experienced inventors, makers, molders, dealers and sales engineers will reach you in Plastics, monthly:
Valuable surveys of international patents and processes will be exclusive features, and great savers of time and cost, to you:
Direct interviews with leading pioneers and distributors, will continue to give you practical ideas:
A series of studies in the character of all the pyroxylins, resinoids, caseins, shellacs and their derivatives, has already begun:
Revelations of coming products from new synthetic resins and cellulose fibres will appear from producing engineers and laboratory workers:
Close connection with various Associations, and with official Bureaus, will furnish trade and business data:
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23 W. 3rd Street **Cincinnati, Ohio**

The Tariff and The Pyroxylin Plastic Industry

(*Continued from page 286*)

novelties, tooth brushes and tooth brush handles, etc. etc. In the manufacture of these commodities, with the exception of combs and tooth brush handles, the labor in fabrication is by far the principal element of cost. Even in case of the more bulky articles such as combs and tooth brush handles the cost of the labor is greater than the cost of the raw ingredients. This being the case, pyroxylin plastic manufacturers maintain that in order to equalize the labor costs in competition with foreign countries a very high rate of duty would be essential for the maintenance of the industry in America. Some statistics on comparative money wages as of May, 1, 1926, taken from the "International Labor Review" issue of August, 1926, show the following for a type of labor similar to that used in the celluloid industry:

Philadelphia	—	65c per hour
Berlin	—	18c " "
Milan	—	11½c" "
Japan	—	10c " " (estimated)

Another objection that has been raised to the present method of tariff regulation is that it is faulty as to correctly classifying dutiable articles. This leads to erroneous information regarding total volume of imports of a particular class as well as permitting such articles to be entered under two or more different rates. The pyroxylin plastic manufacturers have therefore submitted revisions to the House Ways and Means Committee, specifically naming tooth brush handles, tooth brushes, toys and dolls, combs, pencils, fountain pens and fountain-pen holders, each with its own rate of duty.

The Pass-A-Lite.

Durez Used For Molded Parts in Two New Cigar Lighters

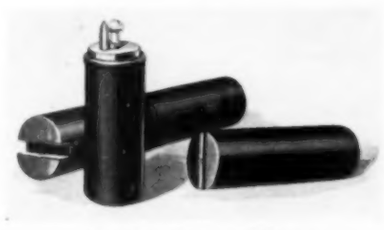
WITH all of the new devices for lighting cigarettes and cigars, it would seem that there was little left to be done in the way of improvement.

Stewart-Warner, however, have ever proved that this was not so in their varying line of products and the Pass-A-Lite bids for the motorists' acceptance, as a convenient accessory.

The Pass-A-Lite is the new wireless, cigar lighter and is molded of Durez. It gives a perfect light in any wind, has no trailing wires and uncertain reel. It is simply operated and is picked off the dash board and may be handed around to all passengers, serving each.

It is handsomely packaged and retails for $2.50.

The public must have many lighters—another new and compact, never-filling flint lighter has been put on the market by the Toledo Rex Spray Company. The case is molded of Durez.



The Rex Spray Lighter.

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Say you saw it in PLASTICS

Domestic Exports of Pyroxylin Products, From the United States, By Countries

January, 1929

Countries	Sheets rods, or tubes		Manufactures	
	Pounds	Dollars	Pounds	Dollars
Germany	1,539	242	654	418
Italy	436	1,083	117	82
Netherlands	.....	.....	48	139
Sweden	.....	.....	100	500
Switzerland	.....	.....	22	260
United Kingdom	52,301	53,721	78,329	66,946
Canada	195,529	147,331	15,756	27,428
Guatemala	31	41	84	542
Honduras	24	20	.....	.....
Panama	.....	.....	156	310
Salvador	.....	.....	12	131
Mexico	569	651	7,088	11,256
Bermudas	.....	.....	25	31
Trinidad & Tobago	.....	.....	58	127
Cuba	1,092	1,167	1,638	3,157
Dominican Republic	.....	.....	6	19
Neth. W. Indies	.....	.....	2	30
Argentina	.....	.....	189	967
Brazil	.....	.....	4	20
Chile	212	235	244	210
Colombia	127	159	518	1,097
B. Guiana	25	28	.....	.....
Peru	209	290	80	295
Venezuela	19	35	294	645
China	119	119	20	23
Java & Madura	394	367	13	108
Other Neth. E. Indies	101	95	.....	.....
Japan	758	1,288	.....	.....
Philippine Is.	1,062	1,434	1,273	1,070
Australia	5,503	3,517	15,460	11,332
New Zealand	253	172	.....	.....
Union of South Africa	102	87	70	212
Total	260,405	212,082	122,260	127,355
Shipments from U. S. to:				
Hawaii	111	126	247	439
Porto Rico	.....	.....	1,387	1,634

Du Pont Displays Spectacle Frames

A display of Pyralin sheeting and finished spectacle frames in connection with goods of Newport Optical Manufacturing Company of Brooklyn, New York, is one of the features this week at the Du Pont Products Exhibit on the Boardwalk at Atlantic City. The show aroused much interest among visitors to the resort since it gave them an opportunity to see the specially selected Pyralin sheeting and also the various colors of the new rims. Gray, a mixed blue, shell and other colors were featured. The staff of the exhibit explained to visitors how the frames were made, the kind of material Pyralin is, and its wide use for this purpose.

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SHAW

Foreign Trade Notes

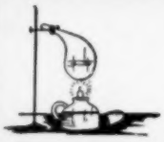
Plastic From Soy Bean Casein

A plastic material, "Satolite", is being manufactured by the firm of Sanko Kabushiki Kaisha, Tokyo, which has purchased a controlling interest in the Satolite Co., organized in May, 1927, by Dr. Sato, who invented and patented a method of manufacture of artificial plastics from soy bean proteins.

It is reported by Sankyo & Co. that the process has proved a commercial success and that the production cost of the soy bean plastic is slightly less than that of pyroxylin plastics of similar composition and quality.

Russian Chemical Developments

The Leningrad Chemical Trust, following the government's orders to expand the chemical industry and to "deliver the country from foreign dependence", has established in its factories the production of numerous important chemicals. Camphor is reported as being synthesized, and in the near future it is expected to start the production of pyramedon, antipyrin and veronal. The construction of a rayon plant has been started in Leningrad, and it will be possible to manufacture large quantities of viscose and artificial wool, which have never been manufactured in Soviet Russia before. The experimental factory of applied chemistry was successful in obtaining aluminum oxide from the Tikhvin bauxites. The tanning factories of Leningrad are now manufacturing cheap tanning extracts made of refuse from the cellulose industry. These extracts are replacing imported quebracho extracts. ("Russian Economic Notes").



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